














Professr Alonge Boothby  
with Dr E. C. Dudley  
Kindest regards

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# DISEASES OF WOMEN;

A TREATISE ON THE PRINCIPLES AND PRACTICE

OF

# GYNECOLOGY.

FOR STUDENTS AND PRACTITIONERS.

BY

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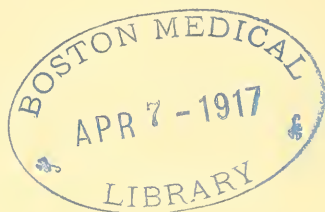
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WITH 422 ILLUSTRATIONS, OF WHICH 47 ARE IN COLORS, AND 2 COLORED PLATES.



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IT HAS BEEN THE AUTHOR'S AIM TO BE A WORTHY PUPIL OF

THOMAS ADDIS EMMET,

TO WHOM

THIS BOOK IS AFFECTIONATELY DEDICATED.

“THIS subject of man’s body is of all other things in nature most susceptible of remedy; but then that remedy is most susceptible of error. For the same subtilty of the subject doth cause large possibility and easy failing; and therefore the inquiry ought to be the more exact.”

FRANCIS BACON, in the *Second Book of the Proficiency and Advancement of Learning.*

## P R E F A C E .

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THIS book is designed to be a practical treatise on gynecology, for the use of practitioners and students ; to contain the most approved precepts in principles and practice ; and to exclude whatever is not founded in pathology or carefully observed experience. If any therapeutic measures of value have not been fully presented, a justification may be found in the author's endeavor to make the text direct and clear by the selection of those measures which in his judgment are most useful.

The autonomy of each pathological process as it may consecutively affect the different pelvic organs has been preserved by the division of the work, not into the usual chapters, each treating of the diverse diseases of a special organ, but rather on pathological lines into five parts, as follows: I. General Principles; II. Inflammations; III. Tumors, Malformations, and Tubal Pregnancy; IV. Traumatisms; V. Displacements and Pelvic Massage. By this classification, which is rather pathological than regional, it is hoped that the reader will gain a better grasp of the sequence and significance of each pathological process. The student will have a much more rational and comprehensive idea, for instance, of metritis by closely associating it with vulvo-vaginitis, salpingitis, ovaritis, and peritonitis, than by regarding it as a distinct and independent lesion. If the uterus were considered regionally, on the other hand, tumors, traumatisms, and other diseases would be thrown in between uterine infections and causal or resultant infections in other parts of the pelvis, and thus a most instructive relationship would be obscured.

Etiological sequence has also been observed; for example, Displacements result from Inflammation, Tumors, and Traumatisms, and are therefore placed after them.

In order to give clearness and brevity to the text, and to bring out important distinctions with force, illustrations in an unusual number, and largely from original drawings, have been introduced. Special attention has been given to the new and full illustrations in Perineorrhaphy, Laceration of the Cervix, Vesico-vaginal Fistula, and to the many colored illustrations in the parts on Tumors and Displacements.

In Chapters IV. and XVII. an effort has been made to indicate the value of routine topical applications which are commonly and extensively employed in office practice, to restrict the amount of meddlesome and injurious local treatment to which in many cases the reproductive organs are subjected, and to refer those cases to the wider field of internal medicine or surgery.

Since dysmenorrhœa, amenorrhœa, menorrhagia, and sterility are only symptoms and not diseases, and must, therefore, always be considered from the view-point of the multiform affections which lie back of them, and since these functional disorders are discussed on many pages, wherever they occur as symptoms of disease, it has been deemed proper to depart from the usual plan of collecting them into a separate chapter; accordingly, the reader is referred for their consideration to the index.

The relations of dress to the health and diseases of women are briefly summarized in Chapter IX. The subject is deemed urgent.

Pelvic Massage after the Brandt method is set forth in the closing chapter, and as a supplement to the treatment of Displacements. The various manipulations are shown in a series of nineteen illustrations. It is suggested that the fulness and detail of the chapter may lead to a more definite recognition of an important but commonly neglected therapeutic resource.

Quotations, abstracts, adaptations, and illustrations when taken from other works are credited in foot-notes giving both the authors' names and the books consulted. The writer has not intentionally at any time omitted to give credit for the work of others except when the matter was so familiar as to be common knowledge.

Much credit is due to Miss Mary L. Rue and Mr. H. F. Andrews for the preliminary sketches of a large number of the new illustrations. Dr. H. M. Bannister, for many parts of the book, and Dr. Palmer Findley, for the part on Tumors, have rendered valuable service in making numerous abstracts from the literature. From these abstracts considerable material has been selected and rewritten in the preparation of the text. Acknowledgment is also gratefully made to Dr. Daniel Eisendrath for critical proof-reading and valuable suggestions in Parts II. and III.

The author desires to record his appreciation of the uniform courtesy and liberality which the publishers have shown in their part of the work.

E. C. D.

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# PART I.

## GENERAL PRINCIPLES.

### CHAPTER I.

#### THE PHYSIOLOGICAL PERIODS IN THE LIFE OF WOMAN.

THE life of woman may be divided into five periods, each corresponding to a special phase of her sexual existence. They are infancy, puberty, maturity, the menopause, and senility.

#### Infancy.

Infancy includes the first ten or twelve years of life, and, although a period of great pathological significance, is rather a subject of pædiatrics than of gynecology. During this period the reproductive organs are, for the most part, functionally dormant; they are undergoing a

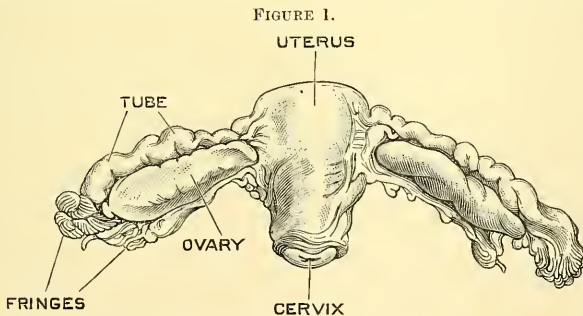


FIGURE 1.  
UTERUS  
TUBE  
OVARY  
FRINGES  
CERVIX  
Uterus, Fallopian tubes, and ovaries of an infant one month old. Natural size.<sup>1</sup>

gradual development preparatory to the more rapid and radical changes of puberty. Malformations and inflammations occasionally observed in infancy will be described elsewhere.

#### Puberty.

Puberty is the period in which the child becomes the woman. Like the menopause, it is a critical transition period. Upon its normal course depends much of the after-health, comfort, and usefulness of

<sup>1</sup> Bland Sutton. Surgical Diseases of the Ovaries and Fallopian Tubes, p. 31.

the individual. Its influences are fundamental, not only in the reproductive organs, but in the entire woman. Puberty has both an anatomical and a physiological basis.

The Anatomical Basis of puberty is the full physical development of the reproductive organs. The infantile uterus is small, soft, and plastic. It varies in size from that of early infancy, Figure 1, to that of the child-uterus just before puberty. At the beginning of puberty its canal would, perhaps, measure two inches; when fully developed at the end of puberty the length is two and one-half inches. Similar changes occur in the ovaries and in the other genital organs. Puberty is also marked by enlargement of the pelvis, by the appearance of hair on the *mous veneris* and elsewhere, by a general rounding of the form with adipose tissue, and by notable psychic changes.

The Physiological Features of puberty are the appearance of menstruation and ovulation. They indicate that the sexual nervous organization is approaching that maturity which renders the woman capable of procreation.

Menstruation is characterized by a bloody, mucous discharge containing epithelial cells and lymph corpuscles; it occurs at regular intervals unless interrupted by utero-gestation and lactation, or by disease or by the menopause; it is the physiological event of a periodical recurrent development in the endometrium, the event of an organic cycle in the sexual life. It first appears, on the average, about the fourteenth or fifteenth year, sometimes as early as the ninth or tenth; and occasionally not until after the eighteenth. Instances have been recorded in which apparent sexual maturity occurred as early as the fourth or fifth year. As a rule, it comes earlier in warm and later in cold climates. Early menstruation is often followed by late menopause. The human menstrual cycle covers a period of about twenty-eight days; the flow continues normally from three to seven days. The average amount during this time is from four to five ounces. Painful menstruation is always proof of some pathological condition. The normal flow is preceded by a sensation of weight in the pelvis.

The utility and physiology of menstruation have been the subject of many strange superstitions and speculations. Nothing is known of its cause or significance. Even the changes which the endometrium undergoes during menstruation are still the subject of speculation and of diverse opinions. One says that the corporeal mucosa is stripped off clear to the muscular layer at each recurring flow; another that only the epithelial layer is shed; another that a newly organized tissue is developed in the intermenstrual period, and that this alone is cast off. Clearly such conflicting opinions cannot be reconciled.

Bland Suttou<sup>1</sup> has made a series of observations on the endometrium of monkeys and baboons, also upon the Fallopian tubes of women removed during menstruation, and upon the uteri of women who died during menstruation. His conclusion is: "In the human uterus the destructive change is limited to the epithelium, and it is doubtful if this change occurs under normal conditions."

<sup>1</sup> Surgical Diseases of the Ovaries and Fallopian Tubes, p. 10.

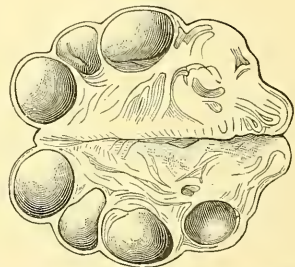
Arthur W. Johnstone, of Cincinnati, who has studied with lenses of very high power the endometrium in its menstrual phases, has a theory that the uterine mucosa is an adenoid structure like the tonsils, the thyroid body, thymus glands, lymphatic glands, and lymph tissues in the walls of the intestine. He says that the essential cells of the endometrium originate as most minute corpuscular granules which can be observed only with very powerful lenses and under the most favorable atmospheric conditions. These corpuscular lymph granules develop not by segmentation, but by gradation into mature cells, and form the endometrium. If pregnancy occur they contribute to the formation of the placenta, otherwise they periodically degenerate and are washed away with each recurring menstruation. This theory is most ingenious, and serves to account for many of the phenomena of menstruation and gestation. It has not yet, however, received full confirmation.

Ovulation involves the maturing of the Graafian follicle, its rupture, and the escape of the ovum. Until recently, menstruation has been thought to be an external manifestation of ovulation and dependent upon it; but whatever may be the relation between these two functions, that of cause and effect is no longer tenable, because, first, there is a regular periodicity in the menstrual cycle, and there is no such cyclical regularity in the maturing of the Graafian follicle and the discharge of the ovum; this process is continuous, and occurs even in the mature foetus; second, menstruation sometimes continues after the removal of the ovaries. There is, however, reason to conclude that ovulation and menstruation are both under the control of the same nerve apparatus, and that the nerves of the uterus and ovaries have a certain co-ordination. Garrigues says, "if there is any connection between ovulation and menstruation, both are controlled by a common impulse from the central nervous system."

Although the appearance of menstruation indicates that maternity is possible, it by no means follows that the development of the individual is complete or that she is capable of fulfilling the requirements of maternity. Until about the twentieth year the nervous system is unequal to the strain of child-bearing and child-rearing; the muscles are inadequate to the carrying and expulsion of the child, and the pelvis is often too small to give it safe exit. The period of puberty should, therefore, be taken as extending not only over the few months required for the establishment of menstruation, but always as including the time necessary for full physical development.

During this period the energy of the girl is taxed by the rapidity of the sexual development, by the great liability to circulatory disturbances, by the physical and mental strain of education, by the conventionalities of society, which may require injurious changes in dress and

FIGURE 2.

Section of ovary, showing ripening of ova. Natural size.<sup>1</sup>

<sup>1</sup> Bland Sutton. Diseases of the Ovaries and Fallopian Tubes.



personal habits. The necessity, therefore, for great care is apparent. Nutritious and simple diet, frequent rest, moderate amusements, and adequate exercise are essential. Study, especially during menstruation, should never be pressed to the point of fatigue. Inasmuch as passional life now begins, and the whole nervous organization is therefore subject to new impulses and requirements, reading and associations should be carefully selected, and should exclude whatever may unduly excite the emotions. Errors committed now may leave impressions which can never be effaced and may have grave consequences. Malnutrition, psychoses, sterility, menstrual and other functional disorders are possible results, and may make the woman a hopeless invalid. For reasons already given, one of the most serious errors is premature marriage.

According to prevailing ideas, the higher education and civilization strongly tend to check and to pervert the development of woman, to cause numerous weaknesses, to increase the burdens and dangers of maternity, and to lessen the vigor of the offspring. We are told that the republic is in danger from the deterioration of our women. The limits of this work cannot include an adequate discussion of the question, nor are sufficient facts known upon which to base a valid conclusion. These pessimistic forebodings, however, have arisen and gained headway rather upon assertion than upon fact. The ability of the squaw immediately after parturition to resume the march is often urged as an argument against the higher education of woman, but this proves nothing. Observation among Indian women has abundantly shown that want of care, during and after labor, is the constant cause of complete prolapse of the uterus, vagina, and bladder, and of numerous other diseases which are relatively much more prevalent among them than among the higher classes of civilized women. The educated woman could "resume the march" if it were necessary, and history has shown many heroic examples; but education has taught her that this is unsafe. The savage woman looks old and withered at thirty; the high-class civilized woman preserves something of youth until after the age of fifty. The highest civilization and its resultant heredity, notwithstanding its artificial and social requirements, does not reinforce, but more than offsets any deteriorating influence which may come of a departure from primitive conditions. This is the reason why the vitality of a civilized race is much greater than that of the savage, and why civilized woman has a power of resistance which, if properly trained and directed, will enable her to endure and to survive many trials to which a ruder organization would succumb. To make the deterioration of woman, and through this the enfeeblement of the race, a price which must be paid for the higher education and civilization would be to reverse the law of evolution and to put in its place a law of the survival of the unfittest.

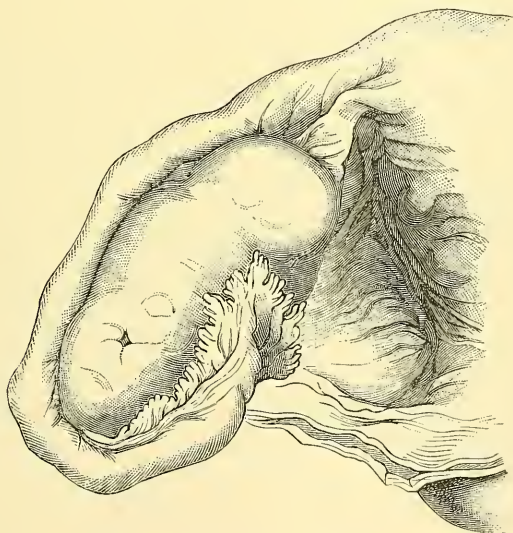
The changes of puberty are in some cases associated with an enlargement of the thyroid glands, called goitre. This condition is not uncommonly limited to the period of puberty, that is, it may disappear with the complete establishment of menstruation. In early goitre the glands are soft and almost fluctuating. If the enlargement persists the

tumor becomes fibrous, hard, and chronic. Such enlargement should be treated in the early stage with inunctions of biniodide of mercury, 30 grains to the ounce. This should be applied daily for periods of four or five days. When the skin becomes irritated the application should be interrupted until the irritation has subsided, and then resumed. These inunctions, together with the continued use of calomel or the bichloride of mercury, in minute doses, will usually result in rather prompt disappearance of the swelling.

#### Maturity.

The time of sexual maturity extends from the end of puberty to about the forty-second year. Under normal conditions this is a relatively healthy period. Unlike puberty and the menopause, it is com-

FIGURE 3.

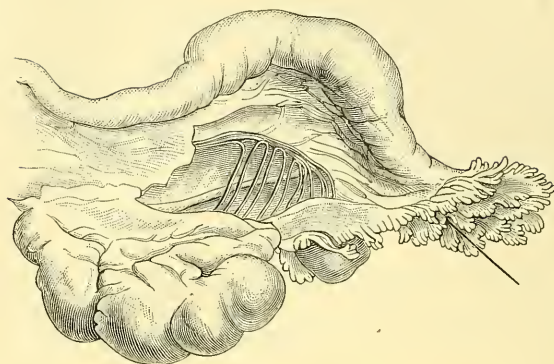


Mature ovary of a woman twenty-three years old, with Fallopian tube in position. Natural size

paratively free from the neuroses and psychoses, except those connected with pregnancy. The woman is subject, however, to the burdens and accidents of pregnancy and maternity, and to physical and mental overstrain; she is also liable to the occurrence of non-malignant neoplasms of the uterus and ovaries which endanger life and health, and to the dangers of puerperal and other infections. During the child-bearing period the gonococcus of Neisser is one of the most potent causes of metritis, pyosalpinx, ovaritis, peritonitis, cystitis, pyelitis, and nephritis. See remarks on gonorrhœa in Chapter X.

<sup>1</sup> Bland Sutton. *Surgical Diseases of the Ovaries and Fallopian Tubes*, p. 2.

FIGURE 4.

Ovary of a woman, aged forty years. Natural size.<sup>1</sup>

### The Menopause.

The menopause, sometimes called the climacteric, sometimes the change of life, is the second critical period. It usually occurs between the ages of forty and fifty. The time of its occurrence is abnormal if before the fortieth or after the fifty-second year. In very cold climates both puberty and the menopause are delayed. Its duration is from three to five years. Pathological causes more or less recognizable may shorten or lengthen it.

The anatomical and physiological basis of the menopause is atrophy of the reproductive organs and cessation of their functions. The follicles of the ovaries disappear, the muscular and glandular elements of the uterus become rudimentary. Both organs shrink to small, hard bodies composed mostly of dense fibrous tissue. The Fallopian tubes become shorter and narrower, and sometimes their canals grow together at one or more points. The uterine canal often closes at the internal or external os. The vaginal portion of the uterus in many cases disappears, so that the upper extremity of the vagina is directly continuous with the uterine canal. The vagina becomes narrower and shorter and loses its elasticity; its lining of pavement epithelium often gives way to a fibrous-tissue surface containing more or less cicatricial tissue. Like changes occur in the vulva. The breasts also atrophy, lose their glandular elements and become smaller, unless, as often occurs, the atrophic loss is supplied or even outbalanced by the deposition of fat.

The essential phenomenon of the menopause is permanent arrest of all functions peculiar to the reproductive organs. It is the inversion of the developmental process of puberty. It marks the end of active sexual life. The atrophic changes are known as senile atrophy.

The symptoms of the menopause are referable to two stages: a stage of menstrual irregularity preceding the cessation of the menses, and a post-cessation stage of variable systemic disturbances. In normal or nearly normal cases the irregularities are not excessive; the systemic

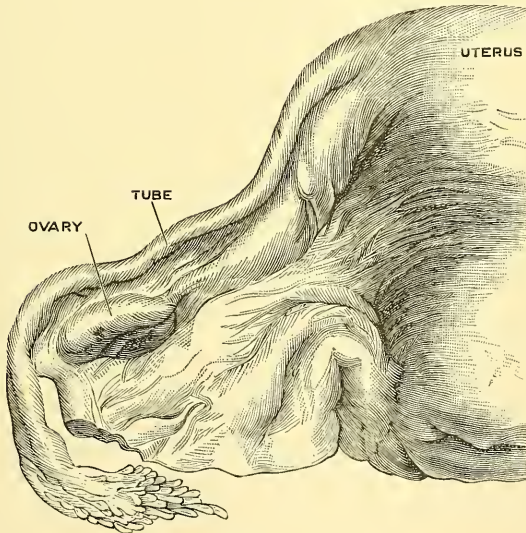
<sup>1</sup> Bland Sutton. *Surgical Diseases of the Ovary and Fallopian Tubes*, p. 3.



disturbances are slight. There is a period of unstable equilibrium. The woman may at times be unusually capricious and emotional; yet she passes through this physiological crisis with only a few minor disturbances. She may have the characteristic vasomotor flushes, perspiration, vertigo, somnolence, numbness, and faintness. The menstrual function ceases as it began, with marked symptoms referable to the nervous system.

Irritability, apprehensiveness, hysteria, melancholia, and other psychic disturbances are common in the abnormal cases, and may be exaggerated. The menstrual deviations vary in wide limits. The flow may gradually decrease and come at lengthening intervals until it altogether ceases; it may occur at short intervals or become continuous; it may become so excessive as almost to amount to dangerous hemorrhage, or life may be jeopardized by a slow, continuous drain.

FIGURE 5.



Atrophied ovary and Fallopian tube from a woman sixty-eight years old. Natural size.<sup>1</sup>

There is an increased tendency to malignant disease of the uterus and breasts during this period. The excessive fear of this may prey injuriously on the mind of the woman. The menopause often cures pelvic disease, because pathology is physiology modified by disease, and because atrophic changes when they arrest physiological processes may also at the same time put an end to pathological processes. Especially is this true if the pathological processes have depended upon the functional activity of the organs involved. It therefore follows that a woman who has suffered for years from chronic uterine or ovarian disease

<sup>1</sup> Bland Sutton, *Surgical Diseases of the Ovaries and Fallopian Tubes*, p. 32.

may now enter upon a long period of increased vigor and robust health. It may, however, be a dangerous, even a fatal mistake to assume that the ills occurring at this time of life properly belong to the menopause; that they need give no anxiety; that they will disappear with it, and that they therefore require no attention. Although such a notion prevails, yet some of the most grave disorders of the menopause are consequent upon pathological states over which atrophy of the reproductive organs can have no control. Continuous and excessive hemorrhages and excessive nervous disturbances are matters of specially grave solicitude, since the one may indicate malignant disease and the other may tend to mental derangement. Prompt diagnosis and energetic treatment may be imperative.

### Senility.

The decline of life is normally a period of repose. The functions of the reproductive organs having ceased, the organs have little physiological significance. The special disorders and dangers of this period, such as inflammations and neoplasms, will be considered in their proper connections.

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## CHAPTER II.

### ANTISEPTICS. ASEPSIS.

THE subject of this chapter falls under two heads: septic infection and aseptic technique.

#### Septic Infection.

Septic infection formerly caused an appalling mortality in the major gynecological operations and made the minor manipulations extra perilous. The fear of infection was so great that when the malady was neither fatal nor very disabling the practitioner often used temporizing measures, however unpromising, to the exclusion of surgical measures, however rational. Now the application of the aseptic principle has made all gynecological procedures relatively safe.<sup>1</sup>

Sepsis is the general term for all surgical infections of microbial origin. The term asepsis, with its corresponding adjective aseptic, is used to imply the absence of these infections. Sepsis is doubtless due more to the products of bacteria than to the bacteria themselves. Septicæmia, toxæmia, sapræmia, and pyæmia are terms used to signify different forms of infection. The presence of infectious microbes in the circulation, together with the chemical action of their products, gives rise to the condition called septicæmia.

<sup>1</sup> For a full discussion of aseptic technique, the reader is referred to the excellent work on that subject by Hunter Robb, Professor of Gynecology in the Western Reserve University, Cleveland, Ohio, and formerly Associate in Gynecology in Johns Hopkins University, Baltimore, Md.

Other microbes exist locally, but may send out their products through the circulation, thereby producing septic toxæmia. When the toxæmia is due to the products of putrefactive bacteria, it is often called *sapræmia*. When pus emboli are carried through the circulation from a focus of suppuration, to set up other foci in different portions of the body, the condition is called *pyæmia*. These terms, although widely used, are not absolutely definite. Our knowledge of the conditions which they signify is incomplete. An apprehension of their meaning, however, is essential to an appreciation of modern surgical literature.

Microbic invasion may be in the form of wound infection; it may also occur directly in the unbroken cutaneous or mucous surfaces. The micro-organisms most important and most often found in gynecology are:

The staphylococcus pyogenes aureus,	The gonococcus of Neisser,
The staphylococcus pyogenes albus,	The bacillus coli communis,
The streptococcus pyogenes,	The bacillus tuberculosis.

Numerous other microbes have been omitted from this list on account of their rarity or lesser virulence. Among them are the bacillus of tetanus, the bacillus of malignant œdema, both rare, non-pyogenic, and most virulent; the bacillus pyogenes fetidus, the pneumococcus, the bacillus pyocyaneus, actinomyces, and the staphylococcus epidermis of Welch.

**Staphylococcus Pyogenes Aureus and Albus.** These are the most frequent and widely distributed, and are the most abundant sources of suppuration. Both are saprophytes—*i. e.*, they flourish on non-living matter and are readily cultivated in the various organic media. The staphylococcus aureus is found in almost all abscesses. It usually appears in groups, often in pairs of fours. In cultures open to the air it forms large, golden-yellow masses. Its pathogenic power is variable, being sometimes more virulent, sometimes less virulent. Its pyogenic properties in man have been clearly proved by the experience of Garri, who rubbed into the uninjured skin of his arm a pure culture of this organism. Four days later a large carbuncle surrounded by isolated furuncles appeared at the site of the inoculation. The inflammation ran the usual course, and it was only after several weeks that the skin healed over completely. Seventeen scars remained as a lasting proof of the success of the experiment.<sup>1</sup> It is the usual microbe of local suppuration, but is said to cause general septicæmia from puerperal or surgical infection. The staphylococcus albus closely resembles the aureus in form and function, but is more local, less virulent, and often associated with it. Both varieties are found with other pyogenic microbes. On culture the staphylococcus albus forms white masses.

The **Streptococcus Pyogenes** is one of the most virulent, fatal, and perhaps the most important of the pyogenic micro-organisms. It occurs usually in chains of numerous cocci joined together. On culture it forms minute colonies rather than large masses. It is probably identical with the streptococcus of erysipelas. It is less local in its effects and much more virulent than the staphylococcus. It is one of the

<sup>1</sup> Adapted from Aseptic Surgical Technique. Robb, p. 18.

most virulent micro-organisms of puerperal and traumatic septicaemia and septic peritonitis.

The *Gonococcus* of Neisser is the microbe of gonorrhœa. It is not readily cultivated in media outside the body. Its nature is therefore rather that of a parasite than of a saprophyte. It may be colonized in blood-serum. Its infection is conveyed only from living individuals. It is a diplococcus, the two members of each group being flattened toward each other to the biscuit shape. Its most striking peculiarity is its power to penetrate and intrench itself in the deeper layers

FIGURE 6.



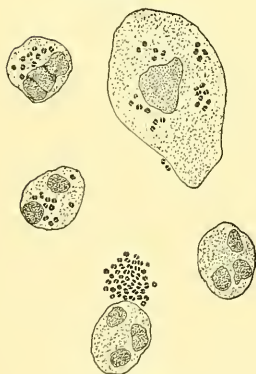
Staphylococcus pyogenes aureus.

FIGURE 7.



Streptococcus pyogenes.

FIGURE 8.



Gonococcus.

FIGURE 9.



Bacillus coli communis.

FIGURE 10.



Pneumococcus, or micrococcus lanceolatus.

FIGURE 11.



Bacillus tuberculosis.

Figures 6-11 are from Robb's "Aseptic Surgical Technique."

beneath the mucous surfaces, especially in glandular structures. It may penetrate to distant organs of the body, having been found in the joints in cases of gonorrhœal rheumatism, in the perspiration, and in the muscular structures of the heart.<sup>1</sup> Its greatest pathogenic significance is due to the persistency of its infection and to its destructive action upon the organs which it infects. It does not set up general

<sup>1</sup> Demonstrated by Councilman in a case of myocarditis following gonorrhœa.



septicæmia. Its action is local, and is most marked and disastrous in the conjunctiva, in the infantile vagina, and in the Fallopian tubes of adults. The gonococcus has been found in the muscular wall of the uterus. See Chapter X., on Inflammation.

The *Bacillus Coli Communis* is saprophytic—*i. e.*, it lives on dead matter. It is variable in shape, but usually a short, thick bacillus with rounded ends, sometimes almost as broad as long. Its normal habitat is the intestine, and it is said to be a frequent microbe of peritonitis following intestinal lesions, and although its virulency in causing peritonitis has been questioned, yet pure cultures of it have apparently produced the disease in the lower animals. It has also been found in the genital and urinary tracts.

The *Micrococcus Lanceolatus*, or the pneumococcus, the peculiar coccus of pneumonia, is another parasitic microbe not easily colonized in the usual culture media. It commonly occurs in the saliva, and is doubtless the source of the often-observed virulence of that secretion. It is an oval, encapsulated diplococcus shaped like a spear-head, occasionally forming itself into short chains. It is the microbe of croupous pneumonia, is pyogenic, and is sometimes associated with the formation of pus in the peritoneum, joints, and genitals.<sup>1</sup>

The *Bacillus* of Tuberculosis is often found in a form of peritonitis known as tubercular peritonitis, also in pyosalpinx. It has been found in inflammations of all the genito-urinary organs. Infection from this microbe is seldom a sequence of traumatism, and it is therefore hardly to be feared as a result of surgery. On the contrary, surgical operations often have a decided inhibitory effect on the progress of tubercular peritonitis, the disease having in many cases disappeared after simple exploratory incisions.

Micro-organisms have been abundantly proved to be the cause of the septic and inflammatory diseases of women. In the examination of the vaginal secretions of nearly two hundred women, Döderlein demonstrated about one-half to be abnormal. In 10 per cent. of the abnormal cases he found the streptococcus pyogenes. Inoculation experiments showed that in 50 per cent. of these the microbe was pathogenic for animals. Clivio and Monti have found the streptococcus in five cases of puerperal peritonitis. Czerniewski found it in the lochia of thirty-three out of eighty-one cases of puerperal fever, while in the lochia of fifty-seven healthy women he found it but once. In ten fatal cases he demonstrated its presence in the organs after death. The countless myriads of cocci present in a single microscopic field of fluid taken from the abdomen in a case of septic peritonitis show the developmental power of the micro-organism. For a physician to go immediately from a case of erysipelas or of streptococcus phlegmon, or of any other virulent infection, to visit other patients, even after the most painstaking disinfection, is scarcely safe. Repeated disinfection on two or three consecutive days is desirable, perhaps necessary. To go without any disinfection beyond the ordinary washing is criminal.<sup>2</sup>

<sup>1</sup> Etheridge. Pneumococcus Abscess of the Ovary. American Journal of the Medical Sciences, April, 1896

<sup>2</sup> Adapted from Robb. Aseptic Surgical Technique, pp. 21, 22.

### Aseptic Technique.

The mere acceptance of the aseptic idea is inadequate. Its thorough and systematic application is essential not only in major operations, but even in simple manipulations. Efficient technique is the outgrowth of a comprehensive grasp and an intelligent appreciation of septic infection, its causes, prevention, and remedies. It requires, above all, the development of what has been aptly called the aseptic conscience.

Asepsis is the absence of infectious bacteria. Strictly speaking, this may be an ideal condition, since it is not always fully realized; but it is usually possible to limit the number of bacteria to a safe minimum, or to render them harmless by means of drugs, chemicals, and other agents. Such agents are called antiseptics. When the antiseptic has the power to destroy germs it is often called a disinfectant. The use of antiseptics may be either prophylactic or therapeutic.

Asepsis involves a great number of details variable and hard to anticipate. Their complete description is impossible and unnecessary. Once grasp the great principle of asepsis, and the subordinate details, otherwise complex, become simple. The intelligent operator, for example, who knows that septic infection is the result of contact, need not be told that during an operation he must keep his hand off from whatever is not sterile. The danger of sepsis is in a measure proportionate to the length of the operation, to the exposure of the wound or cavity, and to the extent of the traumatism. It follows, therefore, that an operation should be finished as rapidly and with as little operating as possible. At the same time, the slow operator, if gentle and firm in his movements, is less dangerous than one of rapid and violent movements. Accordingly, gentleness and rapidity are desirable.

The object of the prophylactic use of antiseptics is asepsis. Before any gynecological operation or manipulation the operator's hands, the instruments and other appliances, and the field of the operation or manipulation should be rendered surgically clean and so maintained throughout the operation. The therapeutic use of antiseptics is indicated when infection has actually occurred. Then the field of infection, if local, may be opened and disinfected or drained; if the infection is systemic, the internal use of antiseptic drugs may be indicated. When there is no infection and the use of antiseptic drugs is therefore prophylactic, they should be used but sparingly, if at all, and not in contact with the wound. This is because they may by their irritating properties defeat their own object or induce dangerous, even fatal, poisoning. Their use is to secure surgical cleanliness, as soap is used to secure æsthetic cleanliness, and, that object having been attained, they should be washed off with sterilized water from the hands and instruments before these are brought in contact with the patient. The prophylactic use of antiseptics is an antiseptic procedure to an aseptic result.

### Antiseptic Agents.

Heat, soap, carbolic acid, corrosive sublimate, and formaldehyde gas are among the most reliable and practical antiseptic agents.

Heat is the most powerful and available germicide and the most practical for the sterilization of everything which it does not injure. The actual flame and the hot-air sterilizer have been mostly discarded for gynecological use. Moist heat is employed in the form of boiling water or of steam.

**Sterilization by Boiling.** Absolute sterilization for laboratory work requires boiling for thirty minutes on three consecutive days, but for surgical purposes one boiling for thirty minutes is ample. In fact, ordinary pathogenic microbes and their spores are destroyed in a much shorter time. A great advantage of this method is its simplicity. No complicated apparatus is required.

**Sterilization by Steam** is efficient, available, and widely applicable. Everything connected with an operation which is not injured by heat may be made aseptic by this means. For this purpose numerous steam-sterilizers have been devised, that of Arnold being most widely used. It contains a chamber for the articles to be sterilized. The steam displaces the air from this chamber and, coming in contact with the instruments, ligatures, towels, gowns, aprons, dressings, and other articles, renders them sterile, or at least practically safe for surgical purposes, in about sixty minutes. The Boeckmann steam-sterilizer, which works by so-called "over-steam sterilization," is thought by some to be more effective than the so-called "under-steam" sterilizers of Arnold and others. This sterilizer has the advantage of not wetting the dressings so much, and is provided with means of drying them before they are taken out. This process, repeated for sixty minutes on two or three consecutive days, insures the final destruction of any spores which might otherwise survive the first trial and germinate on the next day. For a description of the author's sterilizer and instrument-case combined, see Figures 15, 16, and 17.

**Soap**, although not a powerful germicide, is, perhaps, the most valuable of all antiseptics. It is used in cleansing the instruments, clothing, and other things needed in connection with operations, and for washing the skin of the patient and operator, but more especially for scrubbing the hands and arms of the surgeon and his assistant. The familiar *sapo viridis*, usually called green soap, is immeasurably superior to all others. Its uses will be further considered in the "Preparation for an Aseptic Abdominal Section."

**Carbolic Acid** is a chemical antiseptic of great power. It also has the highest germicidal and deodorant properties; has been more freely and generally used than any other antiseptic; but its destructive properties render it dangerous for the patient and inconvenient for the operator. Fatal poisoning is not an uncommon result of its use. It corrodes instruments, injures the skin, and by its local anæsthetic properties impairs the tactile sense. Its use is now limited to the disinfection of very small areas of local infection, where the quantity used is not sufficient to cause systemic poisoning, even though the acid be used in full strength. The danger of washing out septic cavities with 1, 2½, or 5 per cent. solutions generally prohibits its use in that way; profound shock has repeatedly followed the introduction of weak solutions into the rectum. It is soluble in hot water to the amount of 5

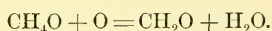


per cent. Its solubility is much increased by the addition of an equal quantity of glycerin.

Corrosive Sublimate, like carbolic acid, is a germicide of considerable power, but dangerous if brought freely in contact with the patient. "Halsted has shown that irrigation of fresh wounds with a solution of bichloride of mercury as weak as 1 in 10,000 is followed by a distinct line of superficial necrosis."<sup>1</sup> This would jeopardize the healing processes, and, together with the danger of fatal systemic poisoning, would prohibit its use in irrigation of fresh wounds and septic cavities. Its use is further restricted by recent investigations which have not fully sustained its earlier claims as a germicide. Its chief use is for disinfecting the hands after prolonged scrubbing with soap and for the sterilization of surgical dressings, and for solutions in which ligatures and sponges may be kept. The drug, however, should be washed out of them with sterilized water, alcohol or ether before they are used. Irrigation of the bladder by a solution as weak as 1 in 10,000 has been followed by most violent exfoliative cystitis. It should never be used in the urinary system.

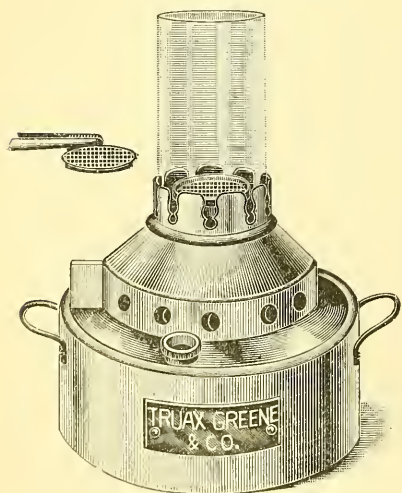
Sodium Carbonate. Common washing-soda is an active germicide when used in a 1 per cent. solution with water, but it does not become active until the solution has been raised to the boiling-point; then sterilization is much more rapid than in plain boiling water.

Formaldehyde Gas is generated<sup>2</sup> by passing the vapor of wood-alcohol—methylic alcohol—mixed with the oxygen of the air through heated platinum gauze. The chemical change is represented by this formula :



As the wood-alcohol vapor,  $\text{CH}_4\text{O}$ , passes through the heated platinum gauze it gives up two atoms of hydrogen, which combine with an atom of oxygen from the air and form water,  $\text{H}_2\text{O}$ . There is left formaldehyde gas,  $\text{CH}_2\text{O}$ . The heat-energy of this chemical change is sufficient to maintain continuously a red heat in the platinum; hence, so long as the materials last, the process, once started, is automatic. The generator, Figure 12, holds a quart of wood-alcohol, and will run itself continuously for about twenty-four

FIGURE 12.



The formaldehyde generator.

hours. When used, it occupies the bottom of a copper sterilizer or of some other receptacle, the upper part of which contains wire trays to

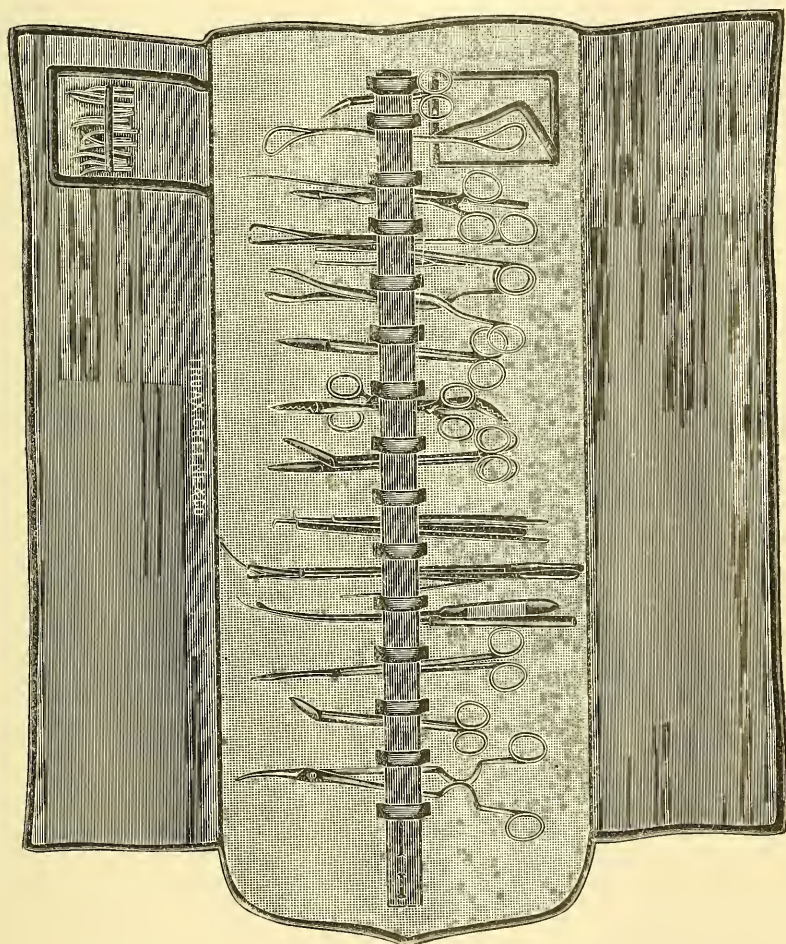
<sup>1</sup> Robb. Aseptic Surgical Technique, p. 42.

<sup>2</sup> The generator is the invention of Mr. Bertram K. Hollister, of Chicago, and is known as Hollister's formaldehyde generator.



hold the articles to be sterilized by exposure to the formaldehyde gas. The gas, having passed through them, is carried off by a small funnel into a chimney-flue or directly out of doors.

FIGURE 13.



Washable instrument-pouch.

Dressings, sponges, towels, instruments, and other appliances are said to be sterilized in less than thirty minutes. It is, however, suggested that the exposure be continued for several hours. The necessity of a funnel to carry off the gas makes the process impracticable for sterilization in private houses before operations. The process is not applicable to the sterilization of rooms and clothing or for the destruction of vermin, and cannot become so until a generator has been invented capable of producing larger quantities of gas. An objection to the generator is its liability to get out of order.

Many other antiseptics, such as alcohol, ether, essential oils, turpentine, and boric acid, are useful in their places, and will be considered later. Iodoform is rejected because of its poisonous properties and because of its offensive odor, which may induce prolonged nausea and vomiting.

#### Instruments, Pouches, and Bags.

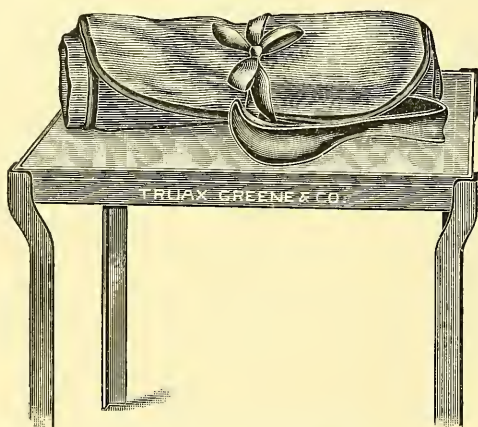
The conventional leather instrument-pouch is a pestiferous incubator of disease, and must, therefore, give place to the aseptic pouch of some washable fabric, which may be sterilized by boiling, and changed frequently. Figure 13.

The leather instrument-bag is certain to become unclean and therefore dangerous. The canvas-covered telescope valise is inexpensive, simple, and easily cleaned.

#### Instrument-case, Sterilizer, Sponge-basin, and Trays Combined.

The apparatus shown in Figures 14, 15, 16, and 17 is designed to lighten the burden and add to the safety of surgical work in private houses, especially in the country. From an experience of about three

FIGURE 14.



Instrument-pouch rolled and tied.

years in its use, the writer offers it with confidence in place of the septic instrument-bags, the conventional sterilizer, the cumbersome trays and sponge-basins which make up the usual impedimenta of surgical practice outside of hospitals. The apparatus fulfils the requirements, first, of an aseptic instrument-case; second, of a steam-sterilizer; third, of instrument-trays and sponge-basins. It consists of two rectangular sterilizers made of copper, nickel-plated, in which may be packed all instruments and other appliances requisite for an abdominal section or for any other ordinary surgical operation. Its component parts may further be used separately as pans, sponge-basins, and trays. The whole outfit, enclosed in a washable canvas cover or in a telescope valise, is sixteen inches

long, nine inches wide, twelve inches high, and when packed ready for an operation weighs about twenty-five pounds. See Figure 15. This case contains a complete set of instruments, towels, sponges, ligatures, sutures, dressings, aprons, nail-brushes, sterilized green soap, ether, chloroform, alcohol, antiseptic drugs, rubber sheet, douche-bag, etc. The equipment is adapted for work anywhere. It especially solves the problem of aseptic surgery outside of hospitals, whether at the house of the prince or of the pauper.

FIGURE 15.



Combination instrument-case, sterilizer, sponge-basins, and trays, packed, ready to be taken to an operation.<sup>1</sup>

Figure 16 represents the two rectangular copper boxes as they appear under steam when used as sterilizers. Observe that each sterilizer is supplied with four legs, which may be folded against the sides of the box when the box is not in use as a sterilizer. Each box contains two gauze-wire trays, as shown through the broken side of the sterilizer in the right-hand cut of Figure 16. The lower tray is one inch above the bottom of the sterilizer, and contains instruments. The upper tray, resting upon the lower, contains towels, dressings, ligatures, etc. The space of one inch between the bottom of the lower tray and the bottom of the sterilizer—*i. e.*, below line A B, Figure 16—is filled with sterilized water. The small trays, D and G, are filled with burning alcohol. These trays are set upon saucers to prevent burning the table-top. The burning alcohol converts the water into steam, which sterilizes the contents of the wire-gauze trays. One of the two detachable handles resting on the table between the two trays may be used to put out the flame by lifting the small alcohol-tray in contact with the bottom of the sterilizer. These detachable handles are also designed for use in separating the different parts of the sterilizers after the sterilization is complete.<sup>2</sup>

<sup>1</sup> Dudley. Journal of the American Medical Association.

<sup>2</sup> This steam sterilizer, if used with thoroughness, is effective, though probably less absolute than the formaldehyde process. The latter is impracticable for sterilization in private houses just before operations. Articles may be sterilized by the gas transferred to the instrument-case and resterilized at the patient's house by steam.



Finally, the several parts of this apparatus may be broken up into sponge-basins, pans, and trays. The two large copper boxes become sponge-basins. The two top covers become trays, holding sterilized

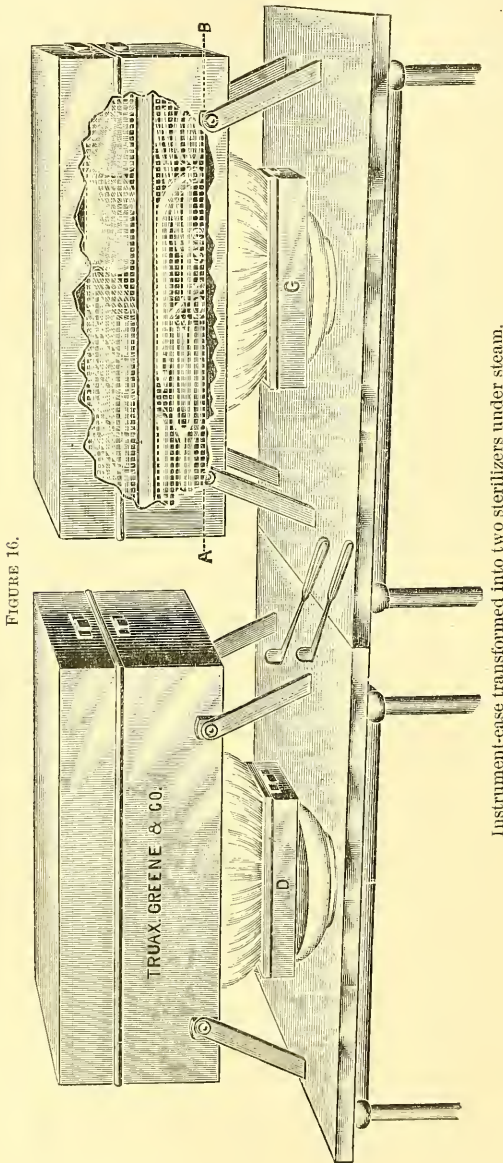


FIGURE 16.

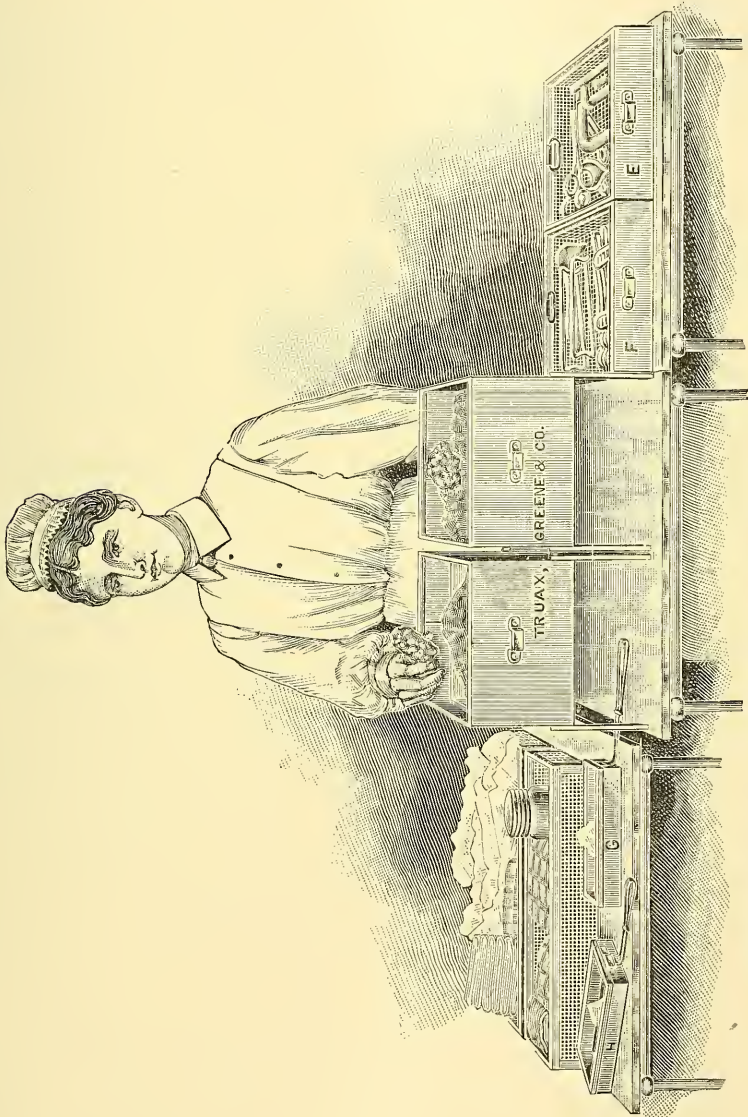
Instrument-case transformed into two sterilizers under steam.

water, inside of which two of the gauze-wire trays containing the instruments are placed. See Figure 17, F and E.

The gauze trays may be lifted out by the detachable handles and placed in the covers without handling the sterilized instruments. The

other two gauze trays to the left of the sponge-basin (Figure 17) hold the towels, gauze, sponges, dressings, and other things which have been sterilized in them. The two small, square, shallow cups which con-

FIGURE 17.



The several parts of the combination instrument-case being used as sponge-basins, pans, and trays.

tained the alcohol now become trays for needles, ligatures, and other small appliances. See Figure 17, H and G. Observe that this sterilizer is quite as well adapted for sterilization by boiling-water as by steam. After the apparatus has been under steam for sixty min-

utes, especially if this process has been repeated three times on consecutive days, not only its contents, but also its various parts which are to be used as sponge-basins and trays, are thoroughly sterilized. Each member of the apparatus is supplied with one or more slots or rings, into which fit the detachable metallic handles already mentioned. These handles are useful to separate the sterilizer into its several parts while hot, and to avoid unnecessary handling. After an operation, even upon a septic case, all the parts of the apparatus may be washed and then sterilized by boiling in a large wash-boiler. The boiling water should contain 2 per cent. of sodium carbonate.

### Preparation for an Aseptic Abdominal Section.

Asepsis necessitates a number of antiseptic procedures all looking to an aseptic result. The scrupulous preparations about to be outlined for major operations are not intended to imply that equal care is unnecessary for minor operations, because the latter are by no means free from danger of fatal sepsis and because a performance seemingly of minor importance in the beginning may end, accidentally or purposely, in opening the abdomen or in some other capital procedure. Traumatic infection of the peritoneum involves the gravest consequences, hence the need of extreme precautions in technique; and since the greater may include the lesser, the same technique will suffice for the minor procedures.

The recklessness which results in the unnecessary removal of pelvic organs seldom escapes criticism. The recklessness which results in the unnecessary introduction of sepsis into the peritoneum is often passed by without comment. The danger to life, however, is determined less by what the surgeon takes out than by what he puts in. The development of sepsis requires two conditions: first, pathogenic bacteria must be present; second, the way must be opened for them to enter. Experiment has shown that they may be transmitted even through the unbroken skin or mucous membrane, but that traumatism makes an open door. Pathogenic bacteria have their source, first, in the operator or his assistants; second, in the instruments and other appliances; third, in the patient. The antiseptic procedures to an aseptic result must, therefore, be these:

1. Preparation of the operator and his assistants.
2. Preparation of the instruments, sponges, dressings, and other appliances.
3. Preparation of the patient.

#### 1. Preparation of the Operator and His Assistants.

The operator and his assistants should be in good health. Since the breath may be the medium of infection, they should especially be free from nasal catarrh and coryza. Disorders of nutrition which involve deficient elimination through the bowels and kidneys may throw that function upon the lungs, and cause the breath to be loaded with fetid products, an undoubted source of infection. The bacteria of saliva may be most infectious; hence unnecessary talking over the field of



operation is objectionable, for small particles of saliva and its bacteria may reach the wound. The daily bath is an important part of the routine of aseptic surgery. Special clothing made of washable material is desirable, for women the usual costume of the trained nurse, and for men trousers and shirts or short coats. Special clothing for operation has a threefold advantage. It protects the operator from taking cold after leaving the operating-room in his ordinary clothing, which, if worn during the operation, might be wet with perspiration. It saves the ordinary clothing from contamination when the operation is upon a septic case. It is, above all, an antiseptic measure in the interest of the patient.

**Sterilization of the Hands and Arms.** The extreme mortality of abdominal sections in former times was due in great part to direct infection from the hand of the operator. To wash the hands rapidly in soap and water and then to dip them in some antiseptic solution, a not uncommon practice even now, gives little protection against infection. Absolute sterilization of the skin without injuring it is ideal and impossible. Practical asepsis, however, is possible. To bring this about numerous antiseptics have been used; by antiseptics is meant antiseptic drugs and antiseptic measures. Of these, prolonged scrubbing with green soap sterilized by heat and with hot water are the most effective. A mixture of alcohol and sulphuric ether, which have germicidal properties, each one part, with four parts of green soap, makes a valuable liquid antiseptic soap. The green soap should be of good quality and previously sterilized by heat. Beat one pound of this soap in a capsule with two ounces of alcohol until uniformly smooth. Transfer to a glass bottle of at least three pints capacity and add two ounces of ether. Cork well, agitate, and set aside for two hours. Then add, with thorough shaking, two ounces each of ether and alcohol previously mixed. The scrubbing of the hands and forearms, to be effective, must be in soap and water as hot as can be borne without positive discomfort. The heat is a valuable aid in the removal of dirt. The scrubbing must be thorough and vigorous, and prolonged for at least fifteen minutes. The longer the scrubbing the more difficult it is to cultivate bacteria from the scrapings of the skin.

Prolonged scrubbing makes the hands safe, not so much by the destruction of the bacteria as by their mechanical removal. They are removed together with the secretions of the skin and other foreign matter upon which bacteria flourish. To scrub the hands and forearms always use a very large brush, preferably without handle. The large brush is indispensable; it cannot, however, be made to reach those strongholds of bacteria so often overlooked or neglected, the angles between the fingers; to scrub out these angles thoroughly use a brush with a handle of ordinary size, but do not attempt to scrub the other parts of the hands and the arms with such a brush; it is too small. Destroy all brushes that have been used in septic cases. Brushes not in actual use should be made aseptic and kept in aseptic gauze or towels.

After scrubbing with *sapo viridis*—preferably the liquid antiseptic soap just mentioned—wash off all traces of soap with clean water, then wash with alcohol; this dissolves out the fat from the skin; then with

another brush scrub again for one minute in an aqueous solution of bichloride of mercury, 1 in 3000.

The patient is now on the table and the abdomen is uncovered. Before making the incision let the anæsthetizer pour freely over the hands of the operator and his first assistant a quantity of ether—*i. e.*, let the hands be washed in a stream of ether which shall flow over the hands and from them directly upon the patient's abdomen. The ether is then wiped off from the abdomen with a wad of dry, sterilized gauze. This will tend further to sterilize the hands and abdomen.

**Sterilization of the Nails, Hair, and Beard.** Let the nails be cut short; long nails retain quantities of dirt which any amount of scrubbing may fail to dislodge. They are also a possible cause of unnecessary irritation, not to say traumatism, and may therefore be both the carriers of poison and the instruments for its inoculation. The shorter the hair the less dirt will there be to fall from it into the wound. The hair and scalp must be kept clean by frequent washing and brushing. The long, full beard is an unnecessary source of danger; the less beard the better. A gauze turban about the operator's head guards the wound from fine particles of dirt which might, otherwise, fall from the hair; if brought well down on the forehead the turban absorbs perspiration and thereby keeps it from dropping into the wound. The operator's forehead if wet with perspiration may be kept dry by means of a towel in the hand of a special assistant.

## 2. Preparation of Instruments, Sponges, Dressings, and Other Appliances.

**Sterilization of Instruments.** All instruments not injured by heat may be sterilized by boiling or by steam. Sterilization by boiling takes only two or three minutes if the boiling water contains 1 per cent. of sodium carbonate. This method is perfect in its results even though the instruments have been used in a septic case. Boiling in carbolic-acid solution is no more efficient, and it injures the instruments.

Before and after an operation instruments, sponge-basins, trays, and other appliances may be thoroughly washed in soap and water to remove the visible dirt, and then sterilized by boiling in a large wash-boiler. A good way is to sterilize instruments by boiling just after using, and by steam just before using. During an operation the instruments should be arranged in trays and covered, not with antiseptic solutions, but with sterilized water.

**Sterilization of Water.** Water may be sterilized by boiling for thirty minutes three times on three consecutive days. One boiling for thirty minutes makes it safe for surgical purposes. If not already clear, it should be filtered before boiling. In aseptic surgery sterilized water is indispensable for many purposes, such as to wash the hands, to cleanse the field of operation, to irrigate the wound, to wash sponges, to cover instruments in the tray, and, when indicated, to wash out the peritoneal cavity. Ten gallons should be sterilized for an abdominal section. Hospitals are usually provided with receptacles for



sterilized water. At the patient's house water may be sterilized and kept until the time of the operation in two large wash-boilers, preferably new. It should be kept half hot and half cold, so that by mixing the right temperature may be secured.

**Sterilization of Towels.** Towels should be of good quality and free from lint; the so-called glass-towels used for drying glassware are the best. They should be laundered in the ordinary way, then boiled in a 1 per cent. solution of sodium carbonate, ironed, done up in sterilized linen, and packed in a clean, tight box. Twenty towels are required for an ordinary abdominal section. Just before operation they should be re-sterilized by steam or by formaldehyde gas or by both.

**The Sterilization of Sea-sponges** by the usual processes of washing and soaking in antiseptic drugs is tedious, difficult, and not always adequate. The uncertain results of these methods have led most abdominal surgeons to abandon sea-sponges and to substitute for them the readily-sterilized gauze. Sea-sponges, however, have greater absorbing power and greater elasticity; they are therefore superior to gauze both for sponging out blood and for packing to control small bleeding-points by pressure. Notwithstanding these advantages, they are sterilized with great difficulty, and are therefore not preferred.

Since the introduction of the formaldehyde gas process sea-sponges, it is said, may without injury be sterilized in a few hours, and may therefore again come into general use. Before exposure to the gas they should be soaked in water to expand and open their pores, placed in a canvas bag and the sand beaten out of them, then washed through several waters for a long time, or placed under a faucet from which water may run over them for several hours until all remaining sand has been washed out.

**The Sterilization of Gauze Sponges** is by boiling, by steam, or by formaldehyde gas. They should be made of four thicknesses of sterile gauze, and should be six inches wide by twelve to sixteen inches long. Smaller sponges may be overlooked in the abdominal cavity and lost, or, at the end of a long operation in which many sponges have been used, may be difficult to find. The frayed edges of the gauze should be turned in and stitched, otherwise loose threads may stick to the wound or be left in the cavity and become irritating foreign bodies. Round sponges of gauze and absorbent cotton combined may be made by wrapping the cotton somewhat loosely in squares of gauze, the corners being brought together and tied at the top with thread.<sup>1</sup> The cut edges should be folded and hemmed as above directed for flat sponges. Round sponges are in no respect superior, and are much more liable to be lost in the abdominal cavity; hence the flat shape, both of gauze and sea-sponges, is preferable in abdominal surgery.

**The Sterilization of Silkworm-gut, Silk, and all Dressings** may be by formaldehyde gas or by steam. Three sterilizations on consecutive days are desirable.

**The Sterilization of Catgut** by boiling in alcohol and soaking in antiseptic solutions is not always reliable. The gut may be rendered surgically safe by either one of two processes:

<sup>1</sup> Hunter Robb. Aseptic Surgical Technique, p. 112.

1. The dry-heat process of Boeckmann.
2. The formaldehyde process.

1. **The Dry-heat Process.** The individual strands, cut in lengths of two or three feet, are coiled, and each is double wrapped in paraffin paper and placed in a small envelope and carefully sealed. The envelopes are then placed in a wire basket. This is exposed to dry heat, temperature  $284^{\circ}$  F., for a period of three hours on each of three successive days. It is necessary that the temperature on the first day be gradually raised to the required degree; this is because the gut is rendered brittle by a rapid increase of temperature before the moisture has been dried out and replaced by the absorption of paraffin from the paper. Let the temperature be raised to  $212^{\circ}$  at the end of the first hour and maintained at this point for one hour continuously, then raise it gradually so that at the end of the third hour it will be  $284^{\circ}$ . The temperature must now be held between  $284^{\circ}$  and  $300^{\circ}$  for three hours. In repeating the process on the second and third days the temperature may be rapidly raised to the required degree.

2. **The Formaldehyde Process.** Formaldehyde forms definite chemical compounds with albuminoid substances. The chemical process which takes place in the albuminoids so modifies the character of the gut that it will resist boiling in water for twenty or more minutes. The immediate action of the formaldehyde is to render the gut brittle. The brittleness, however, is overcome by boiling. The boiling may be repeated without material injury to the tensile strength of the gut. After boiling the gut may be preserved for use in absolute alcohol, or a sufficient quantity for use may be boiled just before each operation. Ligatures prepared by this process will resist absorption as long as the ordinary chromic catgut. The writer has found them intact six weeks after the operation. Dry heat may be substituted for boiling.

The formaldehyde process comprises five steps:

1. The gut is tightly wound on sections of glass tube, and the ends are secured. This prevents contraction and thickening on boiling.
2. The fat and other soluble substances are removed by soaking for twelve hours in ether.
3. The gut is transferred to a 5 per cent. solution of formaldehyde and soaked in it for twenty-four hours.
4. The tubes are kept under constantly running water for twenty-four hours, to wash out the excess of formaldehyde.
5. Final sterilization is secured by boiling twenty minutes in water.

**Aseptic and Antiseptic Dressings**, such as gauze and absorbent cotton, are now articles of commerce. If obtained from the best sources they may be reliable. Absolutely safe antiseptic and aseptic gauze may be readily prepared by the surgeon or nurse. Many kinds of antiseptic gauze are used; two varieties, however, the sublimated and the borated, fulfil all indications. Aseptic gauze is also necessary. Sublimated gauze is useful for external dressings; it is contra-indicated in the dressing of exposed surfaces, because dangerous, even fatal poisoning has resulted from the absorption of the bichloride of mercury. It should never be put into the abdominal cavity. Borated and aseptic gauze may be used with safety on exposed surfaces or even in the peritoneum.

To Prepare Sublimated Gauze, boil plain commercial gauze ten minutes in a 2 per cent. solution of sodium carbonate, wash thoroughly with clean water, boil for thirty minutes in a 1 to 10,000 aqueous solution of bichloride of mercury containing 5 per cent. of glycerin, let it stand in the solution for twelve hours, and dry.

To Prepare Borated Gauze, boil plain commercial gauze ten minutes in a 2 per cent. solution of sodium carbonate, wash with clean water, boil for thirty minutes in a saturated aqueous solution of boric acid, and dry.

To Prepare Aseptic Gauze, boil plain commercial gauze thirty minutes in a 2 per cent. solution of sodium carbonate and wash with sterilized water. The formaldehyde process in addition is doubly safe.

Combination absorbent dressings composed of a thick layer of cotton or wood-wool between layers of gauze, abdominal bandages, utensils, gauze drains, the operation-table—in short, whatever may come into tangible relations with the operation—should be aseptic.

The Operating-rooms should be clean, well ventilated, well lighted, and free from infectious drains and from other septic influences. Remove carpets, stuffed furniture, and every other thing liable to give out particles of dust. Disinfection by means of the fumes of burning sulphur is often attempted, but unless supplemented by steam vapor it is probably useless. Formaldehyde gas is said to be effective. The disinfection of a room by formaldehyde gas requires a large apparatus. Fortunately, however, infection is rather by direct contact than by the medium of the air. Special disinfection of the air is therefore less needed than thorough soap-and-water cleansing of the room itself. Door-knobs and other parts of the room or its furniture, if liable to be in contact with the hand of the operator or his assistants, should be covered with antiseptic gauze.

### 3. Preparation of the Patient.

The antiseptic preparation of the patient has a twofold purpose: first, to remove, destroy, and limit the power of pathogenic bacteria; this requires the local application of antiseptic measures to the abdomen, external genitals, and vagina. Second, to enable the patient to resist any bacteria which may remain or develop. This may require both regulative and medicinal treatment. A searching general examination from the stand-point of internal medicine should be made in every case. This examination may show phthisis or diabetes or some other contra-indication to an operation, or it may show some condition which would make the operation extra-perilous. Then the preparatory treatment should be directed to that condition. To be forewarned is to be fore-armed.

When the operation is not one of emergency the preparation may well include several days of observation and treatment. In this way often the patient's peculiarities may be measured, and her power to resist infection may be increased. Let the abdomen and thoracic organs be examined, especially the lungs, heart, and kidneys. A quantitative examination of urine may show a deficiency, for example, of



urea; then a few days of judicious diet and diuretics may turn the result of an operation in the patient's favor. The daily general bath, with friction, besides being an antiseptic measure, increases the action of the skin and relieves the kidneys.

**The Bowels.** Bowel distention impedes the operator and lengthens the operation. It is a dangerous complication both during and after the operation, and is the cause of a great deal of mortality. So far as practicable, then, let the bowels be emptied of gases and solids and of whatever may ferment and form gas. Experiment has shown that the countless myriads of bacteria habitually present in the intestine may be reduced by catharsis and intestinal antiseptics to a relatively insignificant number; hence the following measures are suggested to render the bowels, as nearly as possible, aseptic.

1. For several days before the operation exclude all food that is liable to ferment.

2. On the third night before the operation give five grains of blue mass. If the bowels do not act freely the next morning, give an ounce of castor oil. One day before the operation give a Seidlitz powder or some other active saline purge. Two compound cathartic pills may be substituted for the blue mass. Repeat the cathartics if necessary.

3. Give repeated high copious enemas during the two days before the operation. The enemas may be of stiff soapsuds, each pint containing, thoroughly mixed, a drachm of turpentine. Persevere in this until no considerable amount of gas remains. If the turpentine and soapsuds enema does not suffice, try a mixture containing two ounces each of glycerin, Epsom salts, and water. Use a flexible rectal tube of firm walls, three feet long, and give the enema as high as possible.

4. Give, also, four times a day, an intestinal antiseptic. Bismuth, salol, compound tincture of cardamom, and guaiacol are among the drugs commonly used. Nothing is better than a capsule containing powdered cinnamon, three grains; oil of cinnamon, one-third grain; and salicylate of bismuth, three grains.

**Cleansing the Field of Operation.** Every abdominal section may require, for drainage or for other reasons, that an opening be made from the peritoneal cavity into the vagina; hence the necessity of cleansing not only the abdominal wall, but also the vaginal surfaces and external genitals.

**Cleansing the Abdomen.** On the night before the operation shave the hair from the mons veneris and external pudenda; scrub the abdomen with green soap and hot water and cover it with a poultice of green soap. Let the poultice be removed in two hours, and the soap thoroughly washed off. Soap is incompatible with the corrosive sublimate about to be applied. Next wash the abdomen with alcohol, then with ether, and apply a large, thick gauze dressing saturated with a 1 to 3000 solution of bichloride of mercury.

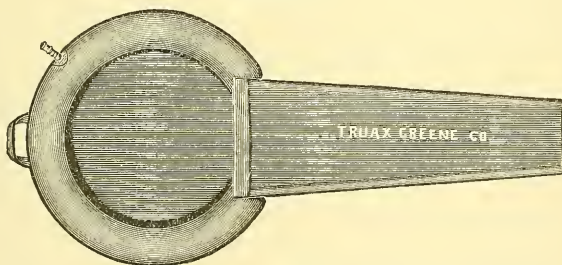
**Cleansing the External Pudenda and Vagina.** The mons veneris and vulva having been shaved, three vaginal douches are to be given on each of the three consecutive days before the operation. Each douche should consist of, first, strong soapsuds made of green soap;

second, sterilized water; third, solution of bichloride of mercury, 1 in 3000.

Just before commencing the operation, when the patient is under the anæsthetic, the external genitals and surrounding parts are thoroughly scrubbed with a large nail-brush, and the vagina is thoroughly scrubbed and swabbed out with a wad of gauze in the grasp of a long hæmostatic forceps. Sterilized green soap or the liquid antiseptic soap, described on page 37, should be used. All soap is now washed away in a stream of sterilized water poured from a pitcher, and the parts are further sterilized by another stream of 1 to 2000 bichloride of mercury solution. It is a wise precaution, especially in a case of infectious endometritis, to curette and disinfect the endometrium before proceeding to open into the pelvic cavity.

In the giving of the douche the Kelly pad will be found more useful and more practical than the bed-pan. Figure 18 shows the appliance and also makes evident its use. The two objections to Kelly's pad are, first, that it is not always obtainable; second, it is difficult to keep clean, and is therefore for surgical purposes apt to be septic.

FIGURE 18.



Kelly's pad.

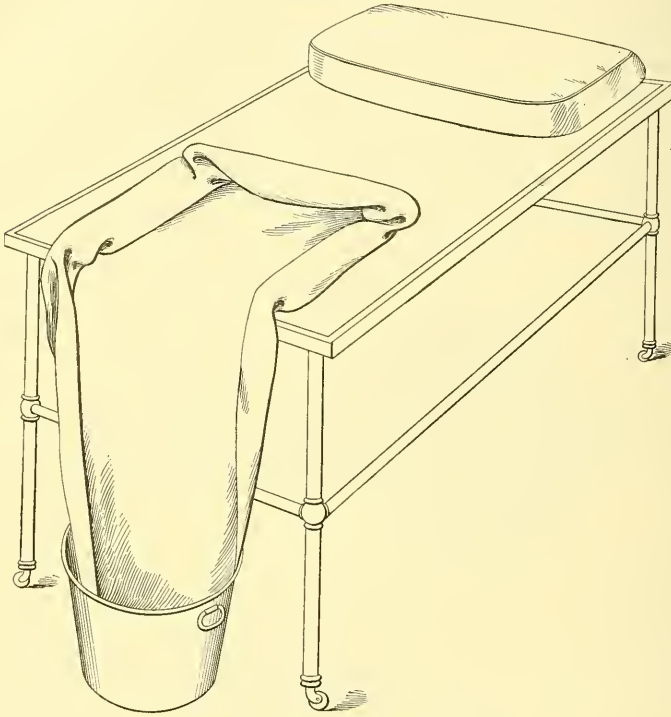
The writer uses a practical substitute for the Kelly pad which obviates both objections. It is simply a piece of sheet rubber, three feet wide and four and one-half feet long. The rubber sheet at its upper end and sides is folded over rolls of towelling or muslin, so that, as in Kelly's pad, the water will be directed into the bucket below. See Figure 19. Rubber sheeting is available everywhere, is easily cleaned, and so inexpensive that it may be frequently renewed. Sheetting which has the rubber finish on both sides is preferable. The ordinary oil-cloth used to cover a kitchen table is obtainable in almost every house.

#### Preparations for an Aseptic Vaginal Operation.

The surgery of the vaginal portion of the pelvic floor is usually classified under the head of minor operations. This designation, since it implies that the operations are trivial and safe even without full precautions, is misleading and dangerous. High vaginal amputation of the cervix uteri and the removal of an intra-uterine tumor by morcellation, for example, are clearly major operations. Curettement,

perineorrhaphy, trachelorrhaphy, dilatation of the cervix, closure of vaginal fistulæ, though relatively safe, are in an absolute sense dangerous. Failure to observe aseptic technique in vaginal operations, although less frequently fatal, is yet full of danger. The possibility of a fatal pneumonia or nephritis as the direct result of an unclean "minor" vaginal operation is not sufficiently appreciated. A single case will serve to illustrate. "From one know all."

FIGURE 19.



Practical substitute for the Kelly pad.

"A woman, fifty-eight years of age, six weeks after a perineorrhaphy gradually developed symptoms of nephritis. Examination of the urine then showed albumin and hyaline and granular casts. She gradually grew worse, and died in coma a week later. At the autopsy minute abscesses were found in the liver, spleen, kidneys, intestines, and in the heart-muscle. Agar-agar Esmarch tubes made from these organs gave in every case a pure culture of staphylococcus pyogenes aureus. The entrance of infection was found to have been the deep perineal tissues, where, just beneath the line of wound, small collections of pus were found. Externally, the wound appeared to have healed perfectly."<sup>1</sup>

<sup>1</sup> Hunter Robb. Aseptic Surgical Technique, p. 64.



### The Asepsis of Minor Manipulations and Examinations.

Since the unclean uterine probe has repeatedly caused fatal metropéritonitis, and since "death has been carried to many a woman under the finger-nails," it follows that the same principles which apply for surgical work also hold good in the ordinary routine examinations and local treatment of the pelvic organs.

**Asepsis of the Patient.** Sterilization of the endometrium, vagina, and vulva preparatory to ordinary office manipulation is impracticable, not to say impossible. Reasonable safety is, however, secured by the hot vaginal douche, which the patient usually takes before applying for treatment. As a supplement to this it is best to wipe out the vagina with dry absorbent cotton on long lock forceps, and then with absorbent cotton saturated with a 5 per cent. solution of carbolic acid in glycerin or with a 1 to 2000 aqueous solution of bichloride of mercury. Disinfection of the vagina or vulva in this way is especially essential if the uterine cavity is to be instrumentally or digitally exposed or treated. By this means the endometrium is protected against the entrance of septic matter, which otherwise may be easily carried in from the vulva or vagina on the instrument—a very common mode of infection.

**Asepsis of the Hands.** The cleaning and disinfection of the hands and nails before and after the most ordinary digital examination are imperative, not only to guard against the carrying of poison from patient to patient, but to prevent self-inoculation with specific or non-specific virus through some abrasion upon the hand. Let the nails be trimmed short.

**Asepsis of the Instruments.** The usual practice of simply washing an instrument in soap and water after each treatment is unsafe. Ordinary washing does not remove bacteria and thereby prevent their instrumental conveyance from one patient to another. Surgical cleanliness may be secured in the following manner: Wash the instruments in hot water and green soap; let each instrument be thoroughly wiped with absorbent cotton saturated with 90 per cent. carbolic acid with glycerin. To do this easily two strong forceps are needed, one in the left hand, to hold cotton, the other in the right hand, to hold the instrument. The instruments thus moistened with carbolic acid are then thrown into a pan containing a boiling 3 per cent. aqueous solution of sodium carbonate, and left there for at least two minutes. It is convenient for this purpose to have always during the office-hour a deep tray of the solution constantly boiling over the flame of a spirit-lamp or a gas burner. A better way is to have several sets of instruments, which may be used one after the other, and then all disinfected together at the end of the office-hour. This saves time and insures safety.

The camel's-hair pencil, brush, and sponge cannot be readily sterilized, and are, therefore, dangerous for repeated use. Absorbent cotton wound upon an applicator or stick or grasped by the dressing-forceps may be used for purposes of local application or for wiping out the vagina, and may then be destroyed.

The Lubricant of Vaseline or Oil, usually kept by the examination-table, is unnecessary for lubricating purposes when the natural secretions are profuse and themselves serve that purpose. Some artificial lubricant is always useful, however, to protect the operator's fingers against infection, but the lubricant is often a source of sepsis in itself or it may easily become so by contact with the unclean finger or instrument. Gonorrhœal and other infection is frequently carried from patient to patient in this way. Neither fingers nor instruments, therefore, should come in contact with the lubricant unless they are free from vaginal and other secretions—unless absolutely clean. The lubricant should be aseptic and non-irritating. Olive oil and vaseline are often septic and always hard to wash off. Soap is apt to irritate the sensitive vulva. For several years the author has used glycerin. It is a most excellent lubricant and deodorant. Even after digital examination of extremely fetid utero-vaginal cancer, the foul, nauseating odor, usually so lasting, may be washed off the examiner's hand by placing it under a stream of running water, if before the examination the hand was freely lubricated with glycerin. For this purpose a superior quality of glycerin is required.

The adaptability of glycerin for this purpose has led to the preparation of a glycerin ointment. It is put up in soft metallic collapsible tubes such as are used for vaseline and paints. The ointment is forced out of the tube by compressing the bottom between the thumb and finger and folding the flattened end as the tube is emptied. The use of the tube obviates the risk of contaminating the lubricant by the soiled fingers. The preparation is a sterilized combination of the following ingredients: Oil gaultheria, 2 gm.; boric acid, 23 gm.; cornstarch, 88 gm.; pure glycerin, 885 gm.; tragacanth, 17 gm.<sup>1</sup>

**A Word of Caution or Protest.** Many a distressing pelvic infection owes its origin to meddlesome office gynecology. Instrumental invasion of the endometrium and other manipulations which require much force are procedures which, under any conditions, may be far from trifling. The physician's office does not furnish for them a uniformly safe environment. They require and should have the safeguards of the home or the hospital.

<sup>1</sup> The formula is the outcome of numerous experiments by Parke, Davis & Company, who, upon the author's suggestion, have perfected the preparation. It is made by them under the name "Glycerin Emollient."

## CHAPTER III.

## DIAGNOSIS.

THE subject is divided into two parts: first, the clinical history; second, the physical examination.

## The Clinical History.

Before asking questions or recording any of the history, it is well to let the patient make her own statement without suggestion. This will relieve her of nervousness and compose her mind for the systematic questioning.

Histories are usually kept in blank case-books printed and bound for the purpose. A very practical way is to keep them in individual envelopes, made of strong manilla paper, each history in an envelope by itself, with the name, residence, and date of the first visit written across the end. The histories are kept in alphabetically arranged pigeon-holes, where they may be readily found. The great advantage of this plan is that the histories may be written away from the office on scraps of paper, and do not have to be copied, but may be filed away together with any subsequent correspondence, prescriptions, or additional notes.

**Form for Record of Cases.** The skeleton form given on the following pages is suggested for the convenient and systematic record of cases. The printed blank is subject to such erasures and additions as the individual case may require. In using such a blank one must keep in mind the fact that no stereotyped form can include suggestions for all the points that are liable to come up in connection with a case. Unless, therefore, one supplements the inquiry by such questions as each special case may call for, he will fall into a dangerous routine.

The record form here presented will help the student and young practitioner to form the habit of accurate and systematic diagnosis. As one gains experience and automatic grasp, and judges less from multifarious details and more from principles, he will gradually eliminate from his histories and records all that is not essential to the efficient analysis of his cases. A few general statements may then serve the purpose of a practical memorandum.

In recording a case one may conveniently use abbreviations and signs, for example, the plus sign (+), the minus sign (—), the plus or minus sign ( $\pm$ ), the zero sign (0), the sign of equality (=), and the letter n may signify, (+) excessive, (—) less than normal, ( $\pm$ ) variable, (0) no, none, or negative results, (=) equals or amounts to, (n) normal; v. s. = 0 would be, for example, a short expression for indicating the absence of vesical symptoms.

## RECORD OF A CASE:

ABBREVIATIONS: The sign + signifies excessive; -, less than normal; v, variable; 0, no, none or negative results; n, signifies normal.

Mrs Blank Address 100 Zero Street.

Age 45 Date of first consultation January 1, 1898.

Recommended by Dr. William Williamson.

1. Nationality American Occupation Housewife Weight 115 pounds. Dates illness from parturition

2. Single, Married, Widow 10 years. 3. Well, ~~not~~ developed. Nutrition good anemic ~~plethoric~~.

4. Family History: Negative.

5. Menses: First menses at age 13. Always, usually regular, irregular, every ~~to~~ 28 days; continues ~~to~~ 6 days. Amount, normal, small, large, clotted n. Color. Last menses commenced December 12, 1897 ended December 16, 1897.

6. Dysmenorrhoea: + pain inguinal, right and left, shooting down thighs, hypogastric, lumbar, bearing down, constant, ~~remittent~~ intermittent for one days before, and during, after flow. In bed 4 days.

7. Intermenstrual Pain: As above but in less degree. Frequent, constant, intermittent, remittent. Walking and especially standing cause bearing down, sensation and exhaustion frequent occipital headache

8. Children: Number 3; oldest 9; youngest 6. Labors normal, rapid, tedious, instrumental. After each labor was in bed 8 weeks. Getting up ~~was~~ ill for one first labor after period of high temperature with pelvic pain

9. Abortions: Number 2; first at 3 months; last at 4 months. In bed 3 weeks each time

10. Leucorrhoea: First appearance 9 years ago. Bloody, purulent, + + mucous, thick, thin, white, pink, glairy, offensive. Constant, worse before, ~~during~~ after menstruation.

11. Bladder Symptoms: Polyuria, ~~incontinence~~ retention, dysuria. Urinates + times during night, + times during day. Frequency ~~not~~ increased by standing or walking.

12. Digestion: Teeth n, appetite + eating causes + distress, distention, nausea, vomiting, eructation, flatulence, acidity, immediately an hour or two after eating. Regular habits of eating. Kinds of food all, tea, coffee, ~~alcohol~~

Foods containing much starch and sugar disagree

13. Bowels: ~~Regular~~ constipation and diarrhoea, alternating. Action ~~firm~~ scanty, ~~liquid~~ offensive, bloody, mucous, ~~purulent~~. Painful at times in pelvis, at anus. Color.

x 5 menorrhagia since birth of second child

x 8 after first parturition evidently had pelvic inflammation.



14. Nervous System: Sleeps badly Hysteria, paralysis, nervousness, neurasthenia.

15. Extra Pelvic Organs: Heart slightly hypertrophied  
Arterial tension high. Intestinal indigestion. General  
functional disturbance of the liver, digestive organs  
and cerebro-spinal axis.

16. Previous Illnesses: 0 except as above

17. Seeks Relief for Menorrhagia, pelvic pain, neurasthenia,  
leucorrhoea, headache and backache

18. Previous Treatment: The usual routine of local  
and general measures.

19. Urinalysis: Amount in 24 hours 70 g Sp. gr. 1008 Reaction n  
Color urine pale Albumen 0 Sugar 0 Urea 17.4 g Total Solids 600 g  
Sediment by Centrifuge slight Microscopical Examination negative  
except few small fragments of granular casts

20. Physical Examination, Diagnosis and Treatment:

- a. Extensive bilateral laceration of cervix
- b. Laceration of perineum to sphincter ani muscle
- c. Retroversion, third degree
- d. Fallopian tube and ovary on left side sensitive slightly enlarged and adherent but not containing fluid.
- e. Cystocele and rectocele.
- f. Endometritis
- g. Chronic interstitial nephritis shown by urinalysis and slight hypertrophy of heart.
- h. Hemorrhoids.

Treatment advised. 1. Pelvic massage after Brandt's method. 2. Curettage, back-blepharoplasty and perineorrhaphy. 3. Removal of hemorrhoids. 4. Regulation of bowels by diet, tonic-laxative treatment and exercise. 5. Regulate diet and mode of life relative to intestinal indigestion, interstitial nephritis and general tendency to arterial sclerosis.

This hypothetical case is not out of the common. The patient had been a well-developed woman, of good family history. The menstrual and other functions had been perfectly normal until after the first child was born. Then came the abnormal developments recorded in sections 6 to 19. Neglected lacerations of the cervix and perineum opened the door for the entrance of infection; hence infection spread through the endometrium and possibly also through the parametric lymphatics and veins to the left tube, ovary, and adjacent peritoneum. Adhesions formed, binding the uterus with its appendages together in a posterior displacement. This displacement is increased and perpetuated by the excessive weight of the uterus, by impairment of support from the lacerated perineum; that is, from injury to the pelvic floor and from the now relaxed, subinvolted state of all the pelvic organs and their supports.

Endometritis and metritis give rise to menorrhagia and leucorrhœa. This explains, partly at least, the anæmia, neurasthenia, nervous irritation, and impaired general nutrition. There is difficult walking and standing, both from general weakness and from displacement of the pelvic organs. This interferes with necessary exercise, and still further adds to the causes of malnutrition. The increased frequency of urination when the patient is on her feet may be explained by the fact that the organs at that time descend to a lower level and drag on the bladder. Intestinal indigestion, sluggish liver, faulty metabolism, constipation, deficiency of urea and of other urinary solids, excess of uric acid, and finally chronic interstitial nephritis, are all not uncommonly associated with pelvic traumatism and infection.

The difficulties of gynecological diagnosis are often increased by the fact that pelvic lesions may exist and cause no definite local symptoms. Even greater confusion may arise from the presence of pelvic symptoms which are caused not by pelvic, but by extrapelvic disorders.

The nerve counterfeits of pelvic disease are most realistic and bewildering. Their clinical sequence is well expressed by the late Dr. William Goodell:<sup>1</sup>

“Nerve-strain, or nerve exhaustion comes largely from the frets, the griefs, the jealousies, the worries, the bustles, the cares and cares of life. Yet, strangely enough, the most common symptoms of this form of nerve disorder in women are the very ones which lay tradition and dogmatic empiricism attribute to ailments of the womb. They are, in the usual order of their frequency, great weariness and more or less nervousness and wakefulness, inability to walk any distance, and a bearing-down feeling; then headache, napeache, and backache. Next come scanty, or painful, or delayed, or suppressed menstruation, cold feet, and irritable bladder; general spinal and pelvic soreness and pain in one ovary, usually the left, or in both ovaries. The sense of exhaustion is a remarkable one: the woman is always tired; she spends the day tired, she goes to bed tired, and she wakes up tired—often, indeed, more tired than when she fell asleep. She sighs a great deal; she has low spirits, and she often fancies that she will lose her

<sup>1</sup> Goodell. Introduction to Keating and Coe, Clinical Gynecology.



mind. Her arms and legs become numb so frequently that she fears palsy or paralysis. Nor does the skin escape the general sympathy. It becomes dry, harsh, and scurfy, and pigmentary deposits appear under the eyes, around the nipples, and on the chin and forehead. The symptom-group of nervous exhaustion—anæmia, backache, bearing-down, difficult walking, ovarian pain, and menstrual disorders—although often without the least gynecological significance, is usually the signal for a gynecological diagnosis. Any pelvic organ showing the slightest irregularity is singled out as the culprit and promptly placed on trial. Endless injurious local treatment and grave surgical operations may now cause the woman to suffer many things from many physicians."

As Goodell aptly remarks: "If no tangible disorder of the sexual organs be discoverable the invisible endometrium or ovaries must take the blame and receive the local treatment. Whatever the inlook or the outlook, a local treatment, more or less severe, is liable to be the issue. Yet these very exacting symptoms may be due wholly to nerve-strain, or, what is synonymous, to loss of brain-control over the lower nerve-centres, and not to direct or to reflex action from some supposed uterine disorder. Neither, for that matter, may they come from some real, tangible and visible uterine lesion which positively exists. Thus it happens that a harmless anteflexion, a trifling leucorrhœa, a slight displacement of the womb, a small tear in the cervix, an insignificant rent of the perineum, or, what is almost always present, an ovarian ache, each plays the part of the will-o'-the-wisp to allure the physician from the bottom factor. To these paltry lesions—because they are visible, palpable, and ponderable, and because he has by education and by tradition a uterine bias—he attributes all his patient's troubles; whereas a greater and subtler force, the invisible, impalpable, and imponderable nervous system, may be the sole delinquent. The sufferer may be a jilted maiden, a bereaved mother, a grieving widow, or a neglected wife, and all her uterine symptoms—yes, every one of them—may be the outcome of her sorrows and not of her local lesions. She is suffering from a sore brain and not from a sore womb."

While admitting the extreme wisdom of Goodell's summing up, it must be recognized that an exhaustive analysis of a patient's condition will often lead to conclusions less imponderable than his *ex-parte* statement would imply. The case above outlined on the record-blank will show an example of possible diagnosis not only, but, if analyzed, will direct attention to the fact that the cure of aggravated local lesions may not result in the complete recovery of the patient. They will, however, be a most important step in the right direction. It is a common mistake, when there are other more general and, perhaps, more serious anomalies, to expect, upon the correction of local lesions, prompt and complete relief. It would be equally a mistake to follow the possible implication of Goodell, and, because we know that local treatment of palpable local lesions cannot completely cure the patient, fail to give that treatment, and thereby fail to cure her as far as we can.

It is, moreover, improbable that a harmless anteflexion, a trifling leucorrhœa, a slight displacement of the womb, a small tear of the

cervix, an insignificant rent of the perineum, or an ovarian ache would often lead a serious practitioner away from the "bottom factor" to useless or injurious gynecological treatment.

### The Physical Examination.

Examination calls into use the special senses, supplemented by such conditions, instruments, and appliances as will increase their power or widen their range.

The conditions to be fulfilled for an adequate examination are numerous and variable. Among them are: 1. Cleanliness. 2. Empty bladder and rectum. 3. A suitable table. 4. Proper attitude and position for the patient.

Cleanliness and asepsis have been emphasized in the last chapter; their importance cannot be exaggerated. Exception: If it is desired to study the character of the uterine, vaginal, or vulvar secretions the preliminary douche and disinfection of the parts may be omitted.

The rectum and bladder should be empty for the following reasons: 1. These viscera, when full, displace the pelvic organs by pressure. 2. Retained feces and urine may be mistaken for solid and cystic tumors. The full bladder pushes the uterus and its appendages upward and backward and greatly increases the difficulty of conjoined examination. Even a small quantity of urine in the bladder may cause the patient to make the abdominal muscles so tense that the uterus cannot be felt between the hand over the pubes and the examining finger in the vagina. A preliminary cathartic to clear the bowels of feces and gas should therefore precede the first examination.

**The Examining Table.** The digital examination may be made with the patient lying on a sofa or bed; but, as Marion Sims has taught, "the one is too low and the other is too soft and yielding for a speculum examination." Even the digital touch and palpation are much better made on a table. If the bed is used the patient should lie across it, with the hips well to the edge, and not lengthwise of the bed. The table is essential for a thorough speculum examination. The conventional office chair, although less objectionable than the sofa or bed, is, by comparison with the table, inferior. An ordinary pine kitchen table, two feet wide, four feet long, and two-and-one-half feet high, covered with a blanket and sheet and supplied with a pillow, will answer every purpose almost as well as the more elaborate table commonly used in office and hospital work. There is some advantage in having the end of the table upon which the pelvis rests about three inches higher than the head.

**The Position of the Patient.** Two positions are in common use, the dorsal and the left latero-prone position of Sims. The knee-chest, the standing, and the prone positions are less frequently used. Each of these positions has advantages peculiar to itself and the conditions under which it is employed. They will be described as the occasion arises.

**Examination of Young Girls.** The first examination of a young girl is approached with reluctance, and is, if possible, avoided. The

advantages of anæsthesia from the stand-point of modesty must be apparent to all. If the hymen is intact an effort should be made to gain the necessary information by a conjoined digital exploration through the rectum, the palpating hands being over the hypogastrium.

**Conduct of an Examination.** The clothing about the waist having been loosened, the patient by stepping upon a chair, the skirts having been raised behind, sits upon the extreme end of the table. She is then assisted to lie upon her back, the head, not the shoulders, supported by a pillow. Before lying down she is covered with a sheet. Under the sheet, and without exposure, the feet are lifted from the chair to the table, placed about six inches apart, the clothing in front is pushed above the knees and the knees are widely separated. The flexure of the thighs, secured by placing the feet on the table, relaxes the abdominal muscles and facilitates palpation. The edge of the sheet as it falls over the knees is parted back between the thighs so as to expose only the part to be inspected—that is, the vulva. The patient is assured that she is neither to be hurt nor unduly exposed. She is now ready for :

1. Inspection of the external genitalia.
2. Digital examination of the vagina and rectum.
3. Conjoined examination.
4. Percussion and palpation.
5. Instrumental examination.

### 1. Inspection.

Inspection of the external genitals and their surroundings is desirable, first, as a forewarning against possible inoculation of the examining finger with venereal or other infection. Some historic cases there are of surgeons who have gone to their death from this cause. Any abrasion on the hand should be protected with a collodion and cotton dressing: a very thin layer of cotton is placed over the abrasion before the collodion is applied. Look for lacerations, scars, and other evidences of parturition, vulvitis, tumors, urethral caruncles, urethritis, eruptions, hemorrhoids, anal fissure, fistula in ano, pin-worms, pruritus, œdema, cystocele, rectocele, ulcers, inflammation of Skene's glands, and other anomalies. Note the calibre and elasticity of the vulvar orifice. Is the clitoris enlarged or imprisoned under an adherent prepuce? Such adhesions may give rise to pronounced reflex disorders. The virgin vulva is usually small, with the hymen perforated only by one or more small openings. It is, perhaps, needless to add that the absence of such a hymen is neither proof nor even strong evidence of unchastity. The virgin labia minora are small, firm, double folds of skin. If they are long, loose, and flabby, and especially if the vulvar orifice is patulous, the indications are that the woman has had one or more children, or has had much treatment, or has practised self-abuse, or has been the subject of some other mechanical interference.



## 2. Digital Examination.

The advantage of the left index-finger in preference to the right was demonstrated and its use popularized by Marion Sims. The great superiority of the left-hand method is usually acknowledged by those who have accustomed themselves to both. These are some of the reasons: 1. The tactile sense of the left finger is more easily educated. 2. Its palmar surface more readily comes in close relations with the left side of the pelvis, and disease is more frequent on the left than on the right. 3. The stronger right hand is better reserved for external palpation. 4. The right hand is left free to pass the probe or sound or to manipulate any instrument. One finger will usually obtain as much information as two. The introduction of two fingers, except in a capacious vagina, is painful. Two fingers may, however, sometimes be of use in the examination of tumors. The manner of digital touch has been well described by Emmet in the following paragraph:

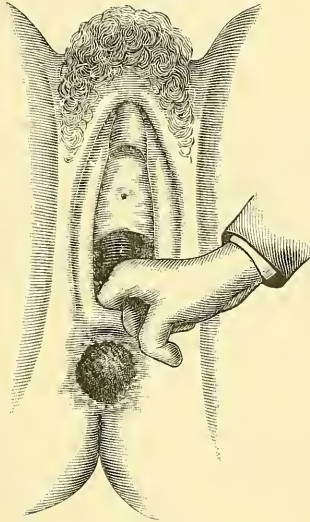
“When the sense of touch has been cultivated, it yields more information upon which to base a diagnosis than can be gained by the eye alone, even when used under equally favorable circumstances. Therefore the digital examination should always be thoroughly and systematically made. It is all-essential to possess a knowledge of departures from the healthy condition. The lighter the touch the more acute it will be, and the more clearly will it appreciate slight changes. It is, indeed, remarkable how individuals vary in their method of making examinations. One will proceed with as much vigor as if he were boring a hole, and finds little more than the cervix, which feels like an obstruction in his way. He gains no information of importance, and inflicts unnecessary pain. Another will pass his finger lightly over every portion of the vagina, and, without having caused any pain, quickly ascertain enough to enable him to fully understand the case. The manner in which I have sometimes seen this examination made, even by men of experience, can be described only as brutal; the amount of suffering they needlessly inflict, and the want of tact evinced by them, ought to debar them from the practice of any branch of the profession.”

The hands having been carefully washed, the left index-finger is lubricated with glycerin, mild castile soap, or glycerin emollient—see page 46—and then slowly introduced, the palmar surface being directed downward so as to depress the perineum toward the rectum; it notes the rigidity of the perineum, the presence, absence, or consistency of feces in the rectum, the calibre and relaxation or rigidity of the vagina, and the condition of the sacrum and coccyx. The palmar surface of the finger is now directed alternately toward the lateral and anterior portions of the pelvis and swept around the cervix. The direction, size, form, and consistency of the cervix, the calibre and form of the os externum, and the presence or absence of laceration become apparent. The right hand is now placed over the abdomen behind the pubes, and the inquiry continued by conjoined examination. Irritation of the clitoris may give rise to sexual excitement; hence the examining hand should be kept well away from it.

Digital examination with the patient standing has some value as a means of diagnosis in uterine displacements. Examination may be made with the woman in the left latero-prone position, but for general purposes is not recommended. This position is reserved rather for speculum examinations and operations.

Eversion of the anus, as shown in Figure 20, enables the examiner to judge of the condition of the lower part of the rectum and anus. This may be done either in the dorsal or lateral position.

FIGURE 20.

Digital eversion of the anus.<sup>1</sup>

### 3. Conjoined Examination.

Conjoined examination, often called bimannual palpation, is designed to bring within the range of touch all the pelvic organs. These organs, one by one, are in some cases lifted forward, by the finger or fingers in the vagina, toward the anterior abdominal wall, where they can be palpated by the right hand pressed down behind the pubes. Usually, however, the right hand forces them down to a point where they may be readily examined by digital touch. The latter method is usually preferable, because the application of much force in the vaginal or rectal touch may be harmful to the patient or may impair the tactile sense of the finger. A combination of both methods is desirable. The necessary amount of force will vary with the tolerance of the patient and the skill of the examiner. The reach of the examining finger is materially increased by forcing the elastic perineum backward and toward the interior of the pelvis. This is usually not difficult, for during the examination the knuckles of the middle, ring-, and little fingers on the left hand are pressed against the cutaneous surface of the

<sup>1</sup> After Mundé. Davenport's Diseases of Women, p. 70.

perineum. Upward pressure on the perineum may be made with the three outside fingers closed, as shown in Figure 21, or open, as shown

FIGURE 21.

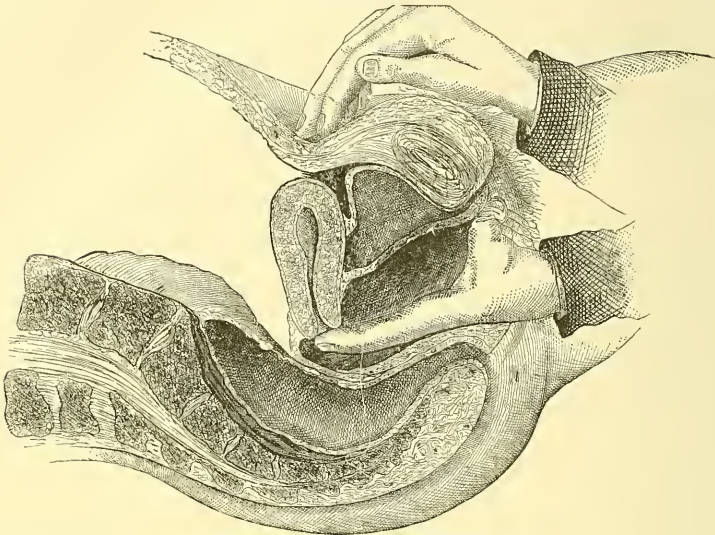
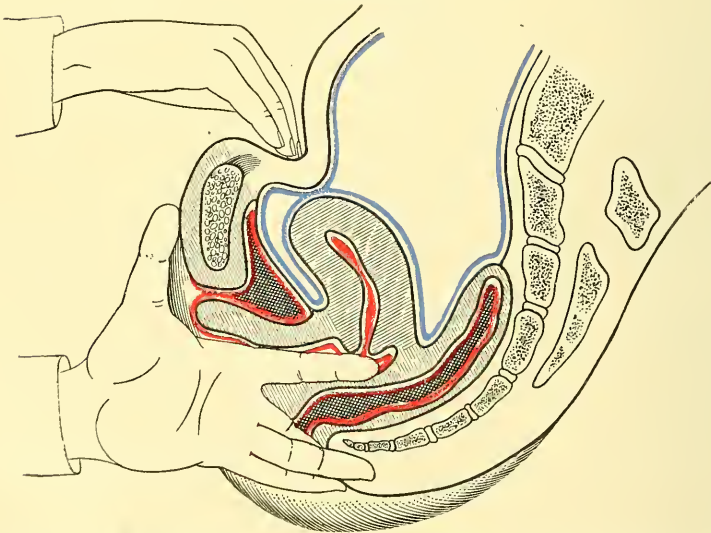
Vaginal touch, conjoined examination.<sup>1</sup>

FIGURE 22.



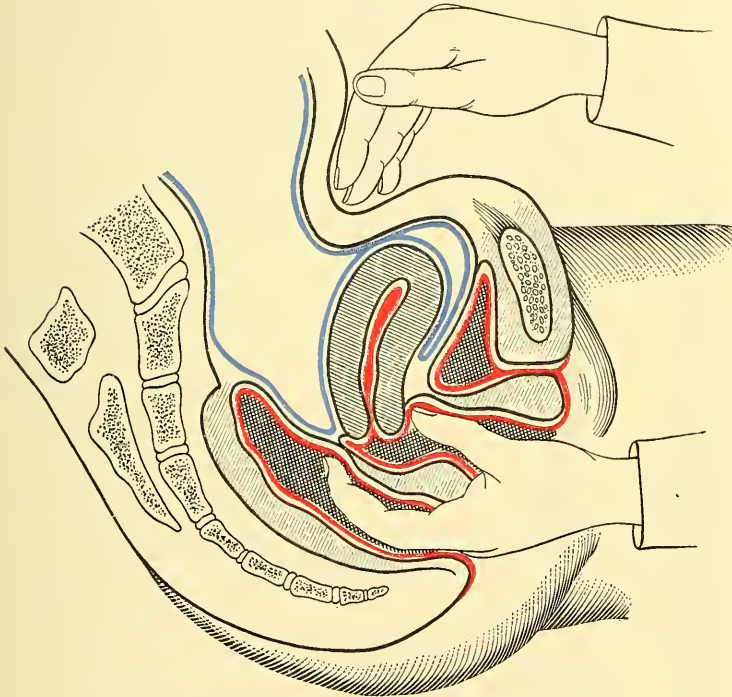
Vaginal touch. Conjoined examination. Outside fingers open. This is the preferable method.

in Figure 22. In the latter and preferable method the web between the index- and middle fingers is in contact with the perineum and exerts the pressure.



Bimanual examination, to be effective, requires long practice. The beginner fails, first, to bring the organs properly between the two hands; second, to appreciate what may be within his reach. If the thickness or rigidity of the abdominal walls prevent the downward pressure of the hand behind the pubes, the resistance may be overcome by continuous, firm pressure, or by successive short strokes of vibratory massage, or by circular massage. The difficulty is often the result of the patient's nervousness. One should, therefore, avoid sudden movements in manipulation. While steady pressure is being made a deep inspiration, followed by a quick expiration, may momentarily relax the muscles, and thereby afford the examiner an opportunity of rapidly

FIGURE 23.



Conjoined recto-vaginal palpation.

palpating the pelvic organs. An examiner of acute touch and quick perception will sometimes instantaneously gain the required information in this way.

If the uterus and its appendages are fixed by adhesions and sensitive, the attempt to force them up toward the outside hand may be futile or even dangerous. Deep palpation behind the pubes is then necessary. One should remember, however, that even a little force injudiciously applied by either hand may rupture a pus-pocket or tube, and thereby lead to serious results.

Bimanual palpation enables one to judge of the following conditions :

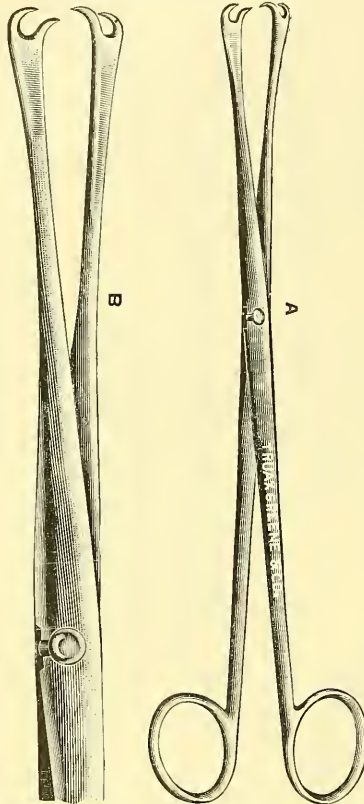
the size, form, location, position, consistency, and mobility of the uterus, the presence or absence of a pelvic tumor. If there is displacement,

FIGURE 24.



Uterine tenaculum.

FIGURE 25.



Small tooth-forceps. A, reduced size; B, section of full size.

is the uterus replaceable, or is it bound by adhesions, and therefore irreplaceable? If there is a tumor in the pelvis, is it a neoplasm or an inflammatory swelling? If the former, it is not sensitive; if the latter, it is tender on pressure. Is it connected with the uterus, or Fallopian tube, or broad ligament, or ovary? Is it cystic or solid, malignant or benign? Does it originate in the pelvis or in the abdominal cavity, and, above all, is it possibly due to pregnancy? These questions will come up again under the diagnosis of special disorders.

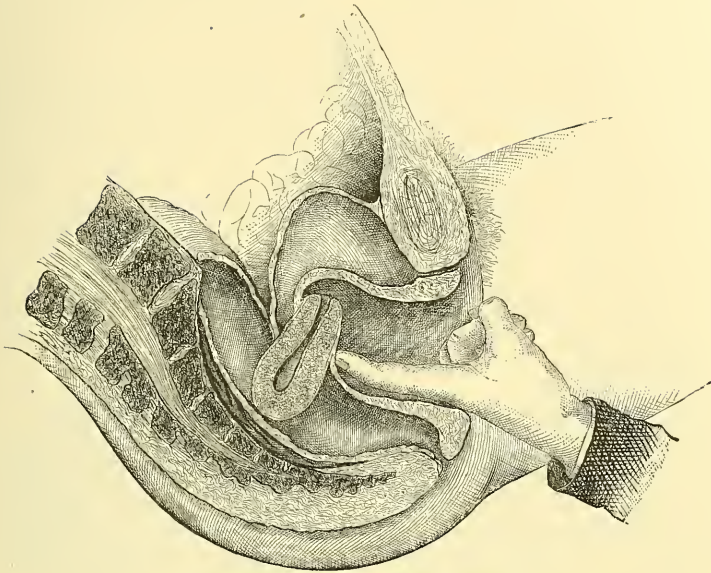
Conjoined examination by rectal instead of vaginal touch may confirm, disprove, or supplement the previous observations and impressions.

Conjoined recto-vaginal palpation is made with the left index-finger in the rectum, the thumb in the vagina, and the right hand behind the pubes. See Figure 23. In this way the perineum is well pushed up toward the interior of the pelvis. If the abdominal wall is thin and relaxed the various pelvic organs, when forced down by the hand behind the pubes, may be picked up, so to speak, between the thumb and finger and definitely palpated.

Palpation of the pelvic organs, especially the ovaries and Fallopian tubes, is often facilitated by drawing the uterus toward the vulva by means of a uterine tenaculum or small tooth-forceps. During the palpation these instruments may, if necessary, be held by an assistant.

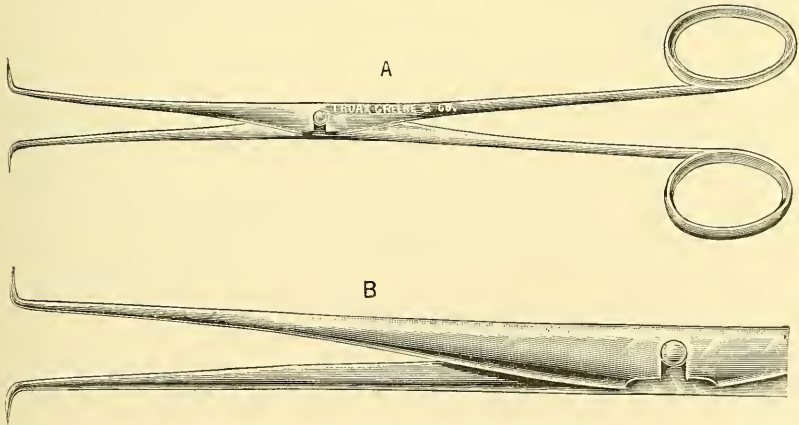
Failure to engage the uterus between the two hands in conjoined examination may be due to a backward displacement, as shown in Figure 26, or to rigidity of the abdominal walls. The latter condition may call for anæsthesia.

FIGURE 26.

Examination of a retroverted uterus.<sup>1</sup>

**Conjoined Examination with the Sound.** One may be unable by touch to decide whether a tumor is of uterine or extra-uterine origin. The organ may then be immobilized by the sound passed into the

FIGURE 27.



The tenaculum-forceps for steadying the uterus.

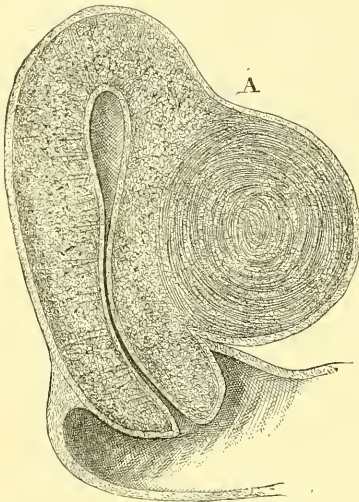
uterine canal and held immovable by the hand of an assistant, or the uterus may be steadied by a tooth-forceps or tenaculum attached to the cervix. The examiner may then determine whether the tumor moves



with the uterus or independently of it. This test, in case of a uterine tumor with a long pedicle, or of an extra-uterine tumor adherent to the uterus, may fail.

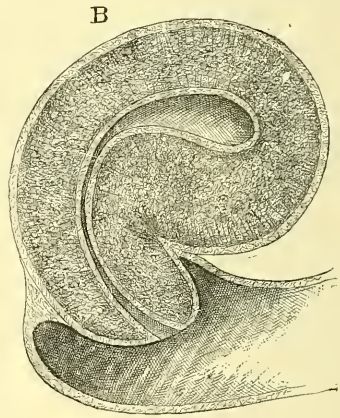
The necessity of conjoined examination is apparent in Figures 28 and 29. Vaginal touch alone in Figure 28, which represent a myomatous uterus, would give the same impression as in Figure 29, which shows an anteflexed uterus. Conjoined examination, in Figure 29, would establish the fact of anteflexion, while in Figure 28 it would demonstrate the presence of a myoma. The exact direction of the uterine canal and the relations of the uterus to the tumor might have to be learned by passing the probe or sound.

FIGURE 28.



Fibrous tumor in the anterior wall of the uterus.

FIGURE 29.



Anteflexure of the uterus.

**Anæsthesia.** If the abdominal muscles are rigid, or the pelvic organs very sensitive, or the patient too nervous to permit an adequate examination, the surgeon should insist upon further examination under an anæsthetic. Intelligent treatment may otherwise be impossible. Accurate adequate diagnosis lessens the number of exploratory incisions and unnecessary operations, or it may cut short a vast amount of indefinite, often injurious local treatment, and substitute rational surgery.

#### 4. Percussion and Palpation.

These means of diagnosis are applicable to the differentiation of abdominal tumors and enlargements of inflammatory origin. See Diagnosis of Uterine and Ovarian Tumors.

#### 5. Instrumental Examination.

As already stated, the development of modern gynecology has been made possible by the use of instruments of precision designed to increase the power or widen the range of the senses. This statement has

even a greater force from the therapeutic and surgical stand-point than from the diagnostic. The diagnostic methods already described will usually make the groundwork of accurate adequate diagnosis. Speculum examination, for example, may supplement and verify conclusions already reached. It is, however, as compared with digital touch, of minor importance. Some of the instruments used for diagnostic purposes are these:

- |                         |  |
|-------------------------|--|
| 1. Speculum,            | 5. The exploratory needle and aspirator, |
| 2. The sound and probe, | 6. The stethoscope,                      |
| 3. The dilator,         | 7. The microscope,                       |
| 4. The curette,         | 8. The cystoscope.                       |

**The Speculum.** The choice of the speculum is simplified by the statement that of the innumerable varieties only two require very serious consideration, and that these two act on the same principle—as perineal retractors. They are :

Sims' speculum.

Simon's speculum.

**Sims' Speculum.** This instrument is great, both in simplicity and effectiveness. The objection, sometimes urged, that its efficient use requires long practice, is a mistake. Whoever once masters the simple principles of the left latero-prone position will have little or no difficulty. The failure to appreciate the mechanical relations of this position to Sims' speculum will explain most of the disappointment in its use. Another alleged disadvantage of Sims' speculum is the necessity of a trained assistant to hold it. If the examiner himself knows how the instrument should be held, the assistant need not be trained. In gynecological examinations the presence of a third party is, for obvious reasons, an advantage. Examinations at the patient's house may usually be made with the assistance of some member of the family. The physician who has a large office practice can have the assistance of an office attendant, or, if this is impracticable, a modified self-retaining Sims' speculum may be used. See Figures 31 and 32.

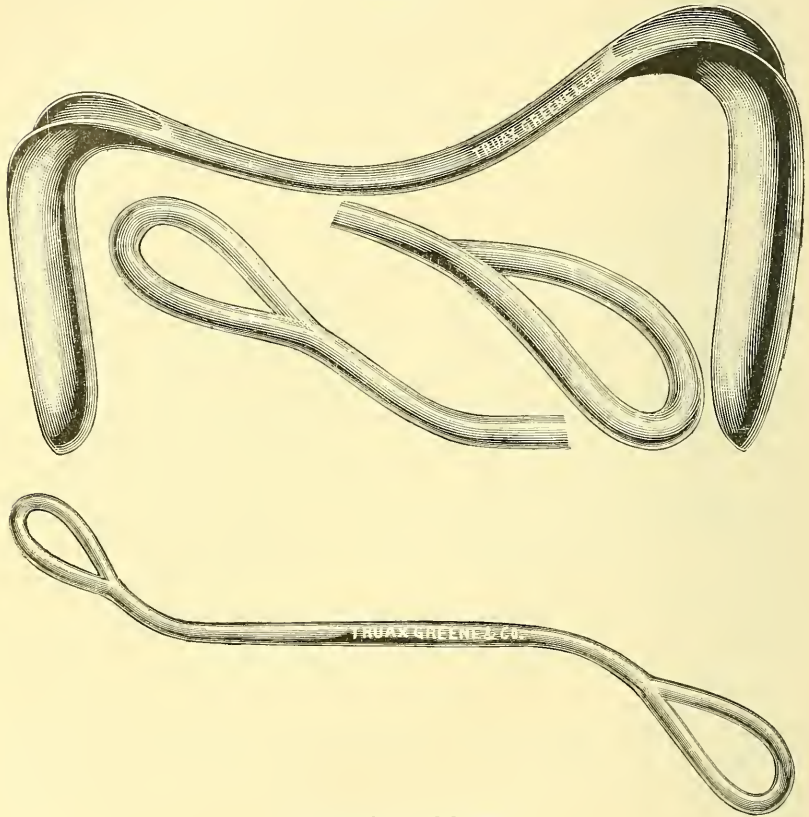
Dr. Thomas, after long experience with other instruments, makes a statement something like this: "Learn the use of Sims' speculum, persevere in the method for three months, and you will never give it up." Dr. Emmet, whose experience with the instrument is, perhaps, greater than that of any other, says: "Dr. Sims' instrument has been modified in various forms, and new ones have been invented on the same principle, with the view of dispensing with an assistant; but, as yet, nothing has been devised which can take its place. This instrument is so simple in design, and so perfectly does it fulfil every requirement, that it will probably never be superseded.

"As long as the sole use of the speculum was to bring the cervix into view, and to facilitate the passage of the porte-caustique in the treatment of supposed ulceration, the cylindrical speculum sufficed. With the advance of knowledge in the treatment of uterine disease, it became necessary to gain more space and light. The cylindrical speculum was therefore gradually superseded by various instruments with expanded blades to open out the upper portion of the vagina, but nearly every speculum of the kind that I have seen is so long that it displaces the



uterus more or less, and by continued use tends to dilate the upper portion of the vagina. I have known both retroversion and prolapse of the uterus to occur in this way from the repeated use of the valvular speculum. The amount of space and light obtained by any of these instruments is very small in comparison with what is afforded by Sims' speculum, and they are useless for all surgical procedures.

FIGURE 30.



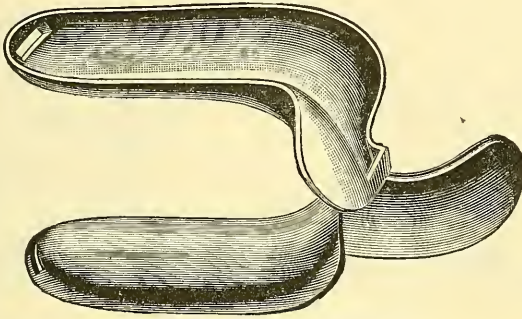
Sims' speculum and depressor.

“The older members of the profession who have become dexterous in the use of some special instrument cannot be expected to change it for a new one or to appreciate the necessity for doing so. But the younger practitioner should begin with Sims' speculum, if he wishes to hold a position in the advance. Full justice, in the light of our present knowledge, cannot be done in the treatment of uterine disease by any other instrument than this perineal retractor, or some other based on the same principle, and, like it, capable of exposing the whole vagina.

“In a single generation the use of this instrument has advanced the knowledge and treatment of the diseases and especially the injuries of women, from profound ignorance to a front rank, if, indeed, not beyond that of any other branch of surgery.”

The Self-retaining Sims' Speculum. Modifications of Sims' speculum to make it self-retaining have been devised by Emmet, Cleveland, and others. They are all inferior to the original Sims' instrument, but superior to any one of the multiform cylindrical and bivalve instruments.

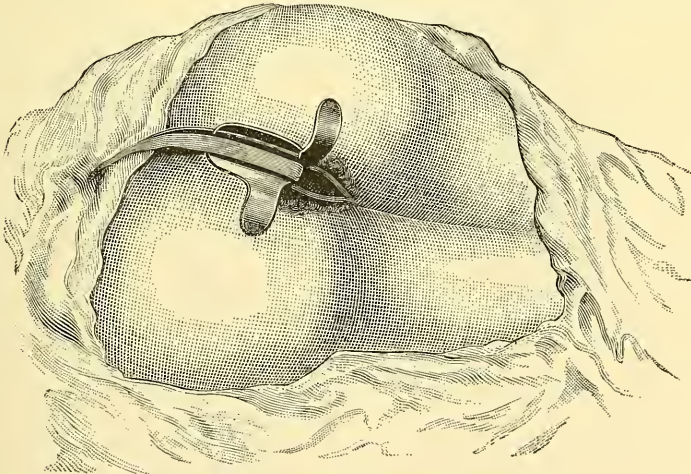
FIGURE 31.



Cleveland's self-retaining speculum.

Cleveland's speculum is one of the best examples of its kind. As shown in Figure 31, it is held in place by a strap attached to the outer blade, by a slot at its inner end, and by the metal band between the blades. The strap passes up over the coccyx and sacrum to join a belt buckled around the waist. Traction by the strap on the speculum retracts the perineum. The blade has a flange for holding up the right buttock and labium.

FIGURE 32.

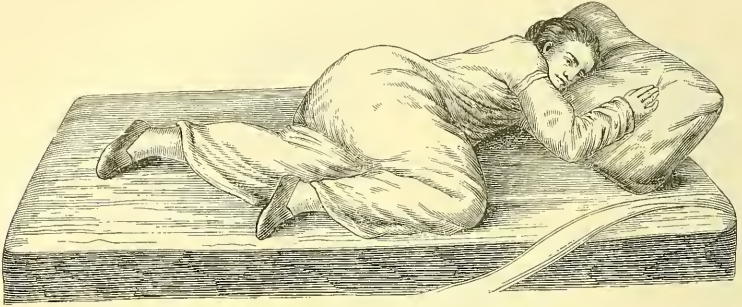


Cleveland's self-retaining speculum in place.

*The Left Latero-prone Position.* In order to appreciate the action of Sims' speculum it becomes necessary to study the effect of Sims' latero-prone position upon the pelvic organs. Like the knee-chest

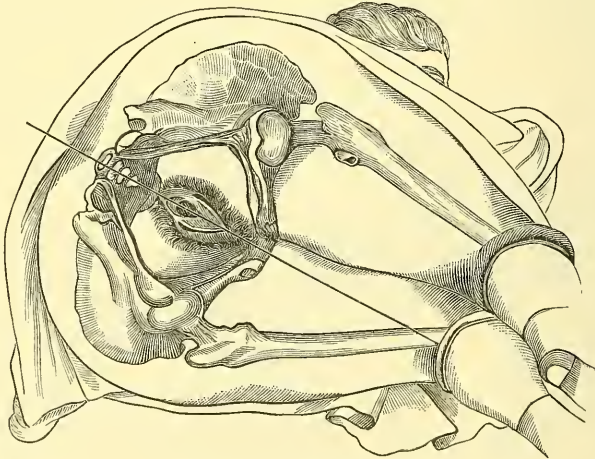
position, of which it is a modification, it causes the vagina to fill with air, and the anterior and posterior vaginal walls—or, to speak more comprehensively, the pubic and sacral segments of the pelvic floor—to separate. The speculum then exaggerates the effect of this position by

FIGURE 33.

Incorrect representation of Sims' left latero-prone position.<sup>1</sup>

hooking or drawing back the perineum, which exposes almost the entire surface of the widely-opened vagina, and causes the cervix to be drawn somewhat toward the vulva.

FIGURE 34.

Correct latero-prone position.<sup>2</sup>

Two requirements are essential to the successful use of Sims' speculum—correct position of the patient and proper holding of the instrument. The patient is to be placed on the left side, the hips being over the left-hand corner of that end of the table which is toward the operator; the knees are to be drawn up toward the abdomen, and the right thigh

<sup>1</sup> After Leblond. From Thomas and Mundé, *Diseases of Women*.

<sup>2</sup> From Hegar and Kaltenbach, *Operative Gynäkologie*.

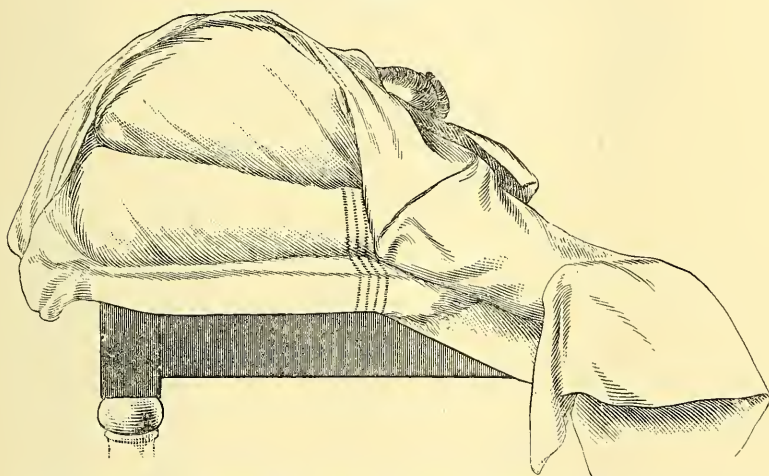


flexed slightly more than the left. The patient's left arm rests behind her on the table. This permits the right shoulder to be thrown forward and depressed toward the right side of the table, so that the position becomes latero-prone; that is, lateral and slightly prone at the hips, and almost wholly prone at the shoulders. The left side of the head rests upon the table, the face looking to the right. The right arm hangs over the right side of the table, and the long axis of the trunk extends obliquely across the table from left to right.<sup>1</sup>

The steps of an examination with Sims' speculum are these:

1. Place the patient, the waist clothing being loose, in Sims' left latero-prone position, the head, not the shoulders, supported by a very thin pillow.

FIGURE 35.



Patient in Sims' left latero-prone position and protected by towels. Ready for introduction of Sims' speculum.<sup>2</sup>

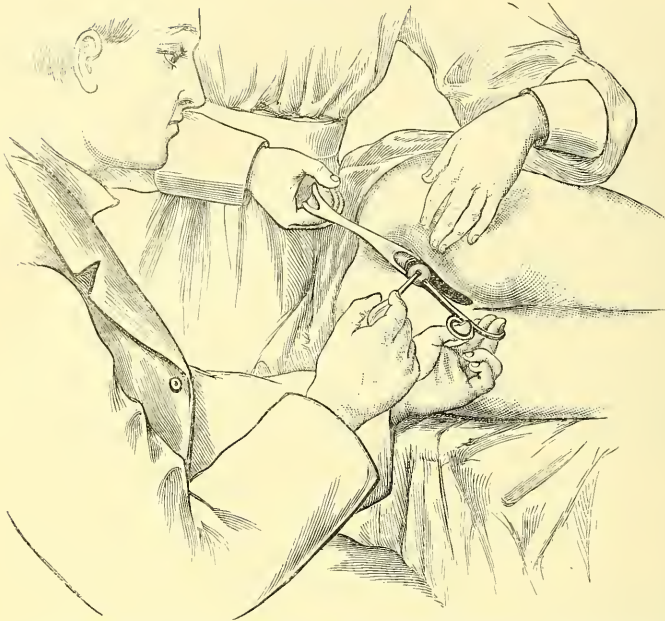
2. Protect the buttocks with the towels, Figure 35.
  3. Let the nurse lift up the right labium, Figure 36.
  4. Introduce one blade of the speculum and place the other in the nurse's hand, Figure 36.
  5. With the depressor in the right hand, push the anterior vaginal wall forward and the cervix will come into full view.
  6. Any secretion in the vagina may be wiped out with a wad of absorbent cotton in the grasp of the uterine dressing-forceps.
  7. If the sound is to be passed or the uterus otherwise instrumentally examined, the surgeon will change the depressor to the left hand and use the right for this purpose. Instead of using the depressor during instrumentation of the uterus, it is often desirable to steady the cervix with the tenaculum or tenaculum-forceps. See Figure 36.
- In many cases the vagina balloons with the inrush of air, and the whole field comes into full view without the use of the depressor.

<sup>1</sup> E. C. Dudley, in *American System of Gynecology*, p. 340.

<sup>2</sup> After Davenport, *Diseases of Women*.



FIGURE 36.



Examination with Sims' speculum. The towels are omitted in order to show the exact position of the pelvis and thighs. Passage of probe or curette; cervix steadied by vulsellum.

The patient is now ready for : 1, inspection of the entire vaginal surface ; 2, instrumental examination of the interior of the uterus.

Inspection of the vagina will enable one to judge of the presence or absence of vaginitis, ulcers, laceration of the cervix, erosion, cystic degeneration, vaginal cicatrices, traumatism, vaginal fistula, carcinoma of the cervix, and other new growths. Pathological discharges may be taken for microscopic examinations, and their source, whether from the uterus or vagina, may be observed.

Simon's Speculum, shown in Figure 38, is a perineal retractor similar to Sims', but with shorter and flatter blades, which are made of different shapes and sizes, and are adjustable to a common handle, so that they may be changed to meet the requirements of the case. It is the favorite instrument of the Germans, and differs from Sims' chiefly in the manner of its use, which requires the patient to be in the dorsal decubitus, and the thighs to be flexed in the lithotomy position. An objection to the instrument is the greater liability of the vesico-vaginal wall to fall down toward the speculum, and of the lateral walls to fall together, and thereby to obscure the field of operation. To obviate this one uses a smaller though similar retractor which acts in the opposite direction, like the anterior blade of the bivalve speculum. Lateral depressors also are often required on either side, all of which

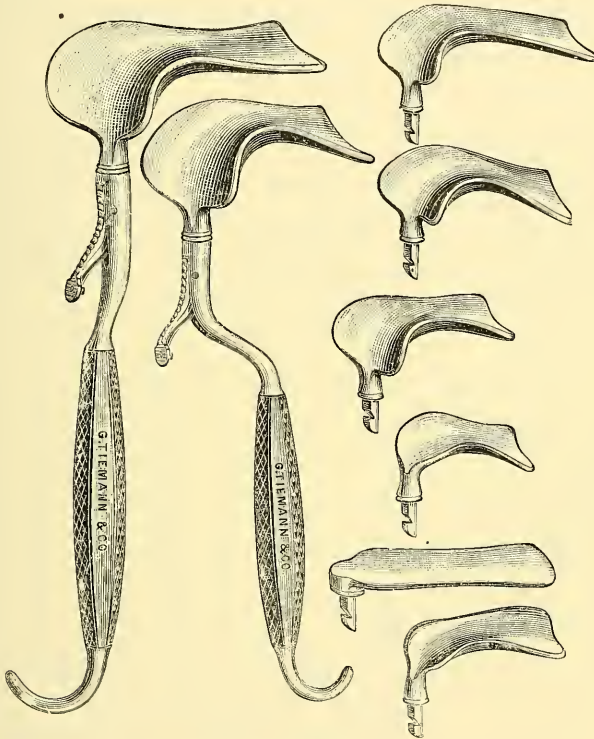
FIGURE 37.



Emmet's uterine dressing-forceps.

are more or less in the operator's way. The introduction of the sound, curette, or other instruments to the interior of the uterus is more difficult in the dorsal than in the Sims position, and if the organ be anteverted or anteflexed the instrument is especially liable to be arrested

FIGURE 38.



Simon's specula : blades of various sizes and shapes.

at some point on the posterior wall of the cervix or at the internal os, and refuse to pass further. Simon's speculum is less easily held, requires more assistants, more attachments and depressors than Sims'; it gives less light and space, and for general use, therefore, should never have the preference over the Sims instrument.

The Probe and Sound have already been mentioned in connection with conjoined palpation as a means of diagnosis in tumors. In some

FIGURE 39.

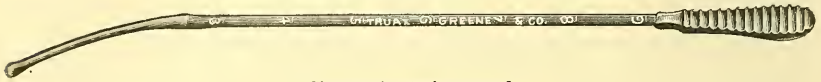


Emmet's fine silver-wire probe.

cases the sound, and especially the probe, may be difficult or impossible to pass in the dorsal, but may be readily passed with the aid of Sims' speculum and the lateral position.

To pass the probe or sound in the dorsal position without a speculum, first introduce the left index-finger to the os externum, then, on the finger as a guide, introduce the instrument into the os and let it find its own way, aided only by slight judicious force, to the fundus.

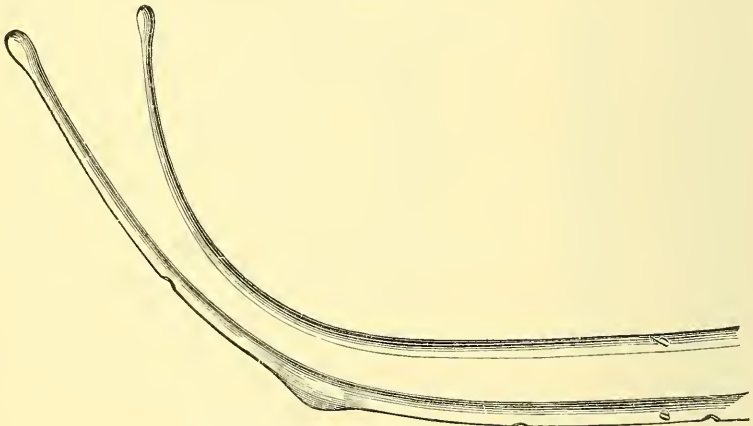
FIGURE 40.



Simpson's uterine sound.

To pass the sound or probe through Sims' speculum first bring the cervix into view, seize it with a uterine tenaculum or a small vulsellum forceps, gently draw it toward the vulva, and pass the instrument. It should be bent before introduction, so as to conform, as nearly as the surgeon can judge, to the direction of the canal. The forward traction of the uterus greatly facilitates the passage—in fact, is sometimes essential.

FIGURE 41.



Sounds of Simpson and Sims compared.

*Dangers of the Sound and Probe.* Numerous cases of grave infection following the use of these instruments have given rise to an impression that they are dangerous. The risk, however, is practically nothing if complete asepsis is maintained. A clean instrument may carry infection from the vagina or vulva; hence the necessity of thorough asepsis of these parts. The sound without asepsis is more objectionable than the probe, for it is not only equally liable to be the carrier of sepsis, but is more liable to wound the sensitive endometrium, and thereby open the door to microbial invasion. The passage of the fine probe is usually painless. The sound in a sensitive, inflamed uterus may be intolerable.

The diagnostic value of the sound and probe is sometimes very great. One may be unable to locate the uterus except by the direction which the sound takes. The tortuosity of the canal may at once show the relations of a myoma to the uterus. The length of the canal is in-

creased, for example, in a myomatous uterus, but not materially increased by the presence of ovarian and other extra-uterine tumors. The case, however, is rather exceptional in which the sound is a necessary means of diagnosis. The more experience one has, the more educated his touch, the less he will need to use these instruments for diagnostic purposes.

Uterine Dilatation may be accomplished in the following ways :

1. By graduated bougies, or sounds, after the method of dilatation of the male urethra.
2. By instruments of diverging blades constructed on the principle of the glove-stretcher.
3. By water dilators.
4. By tents.

Dilatation is more frequently required for therapeutic than for diagnostic purposes. The object of diagnostic dilatation is to open the endometrium in order that by means of the curette a specimen may be removed for microscopical examination, or in order that the finger may be used for intra-uterine digital touch. The technique is the same for diagnostic as for therapeutic dilatation. See, therefore, a description of the latter in Chapter V., on Minor Operations.

**Diagnostic Curettage.** The object of diagnostic curettage is to remove enough diseased tissue for microscopical or other examination. If the curette is small, and the os is patulous, this is sometimes possible without anæsthesia or previous dilatation. Usually, however, curettage requires both. Microscopical examination of the scrapings is frequently the only means of differentiation between hemorrhagic endometritis, post-abortion endometritis, benign adenoma, carcinoma, and sarcoma. The technique of curettage is described in Chapter V.

The **Exploratory Needle and Aspirator** have the same diagnostic and therapeutic significance in gynecology as in other departments of surgery—*i. e.*, the removal of fluid. The contents, for example, of a sactosalpinx, a renal cyst, a pelvic abscess, or an ovarian cyst may be removed for visual, chemical, or microscopical examination.

The uses of the stethoscope and microscope will, as the occasion requires, be mentioned in the diagnosis of special diseases.

#### Examination of the Anus and Rectum.

Everson of the anus by means of the finger in the vagina and rectal touch have already been noticed on pages 55, 57, and 58. Numerous specula have been devised for inspection of the interior of the rectum. For this purpose, however, Sims' speculum is immeasurably superior to all others. Its use is the same as for vaginal examination—*i. e.*, with the patient in the left latero-prone position.

#### Examination of the Urinary Organs.

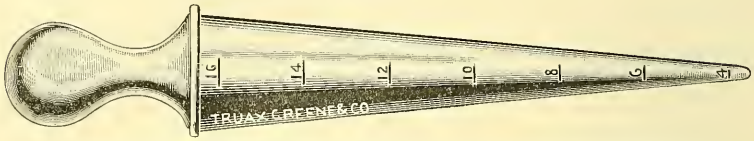
The means of examination are these :

1. Urinalysis.
2. Palpation and percussion.
3. Inspection.



1. Urinalysis. The study of the urine involves, first, chemical; second, the microscopical examination.

FIGURE 42.



Urethral dilator. Underscored numerals indicate diameters in millimetres.

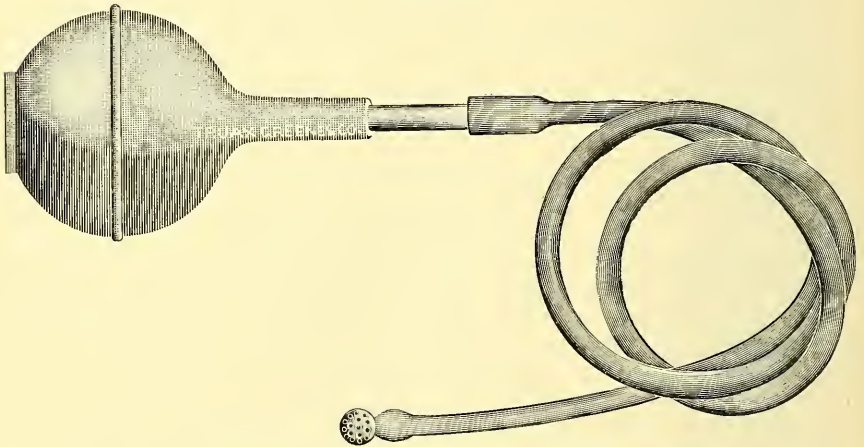
FIGURE 43.



Gum ureteral catheter ; 35 to 50 cm. long.

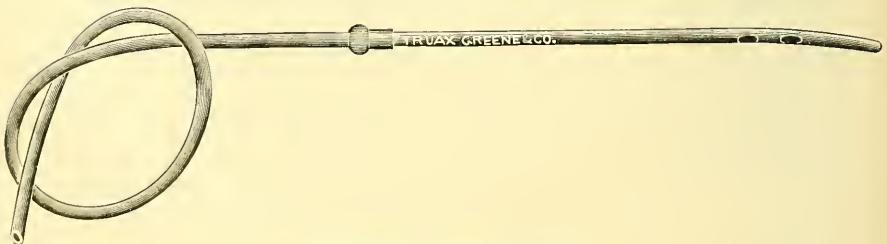
The chemical examination will show changes in the proportion or quality of the solids, and will suggest the possible relation of these

FIGURE 44.



Evacuator. Used for withdrawing residual urine.

FIGURE 45.



Self-retaining ureteral catheter.

changes to pathological conditions and functional disorders. For example, decrease in urea may signify nephritis. Abundance of uric

FIGURE 49.

FIGURE 46.

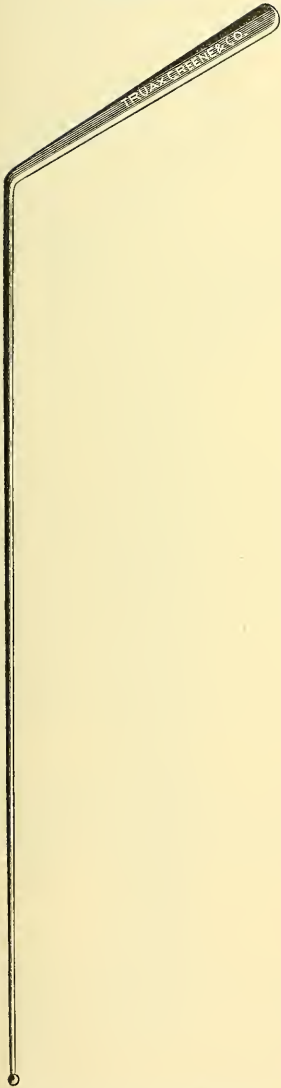


FIGURE 47.



FIGURE 48.



Figure 46.—Ureteral searcher.

Figure 47.—Ureteral catheter. Without handles, for direct catheterization through speculum.

Figure 48.—Delicate mouse-toothed forceps.

Figure 49.—Ureteral catheter with handle, plug, and chain.

acid would indicate that more exercise and less nitrogenous food should be taken. Excessive acidity would account for irritation of the bladder and frequent urination. The microscopical examination may prove and locate the existence of disease either in the kidney, ureter, or bladder.

2. **Palpation and Percussion** over the hypogastrium may give strong evidence of distention of the bladder. Further evidence would be the bulging of the anterior vaginal wall toward the vulva, and constant dribbling of urine. The evacuation of a large quantity of urine through the catheter would be proof.

Palpation with conjoined examination may show a tumor in the bladder. Vaginal and rectal touch may also give much information relative to the urethra, bladder, and ureter. Vaginal touch will enable one to judge of sensitiveness in the urethra and neck of the bladder. In the anterior wall of the vagina to either side of the median line the ureter may often be felt as it passes in a posterior and lateral direction on either side of the cervix toward the kidney. It is normally a flattened, cord-like, soft, yielding band. Pathological changes often make it easier to recognize as a hard, round, larger, more resisting cord. A bougie introduced through the urethra into the ureter facilitates the palpation. Tenderness along the line of the ureter indicates inflammation. Disappointment in the treatment of cystitis is often explained by the presence of unrecognized inflammation of the ureter.

The interior of the bladder may be palpated, first, by the sound; second, by the finger. The sound enables one to judge of the presence or absence of a stone or a tumor. Vesical hemorrhage following the introduction of the sound indicates the presence of inflammation or of a tumor. Palpation by the finger through a dilated urethra is condemned, for two reasons: first, it gives no information which cannot be better obtained by means of the cystoscope; second, permanent incurable incontinence of urine from injury to the urethra occurs in about 3 per cent. of the cases. Digital exploration, if made at all, should be through an artificial vesico-vaginal fistula made for the purpose. See Cystotomy for Cystitis.

3. **Inspection.** The presence or absence of cystocele, urethrocele, prolapse of the urethra, inflammation, and new growths about the meatus may be recognized by direct visual examination. See Inflammation of Skene's Glands, under Vulvo-vaginitis.

### The Cystoscope.

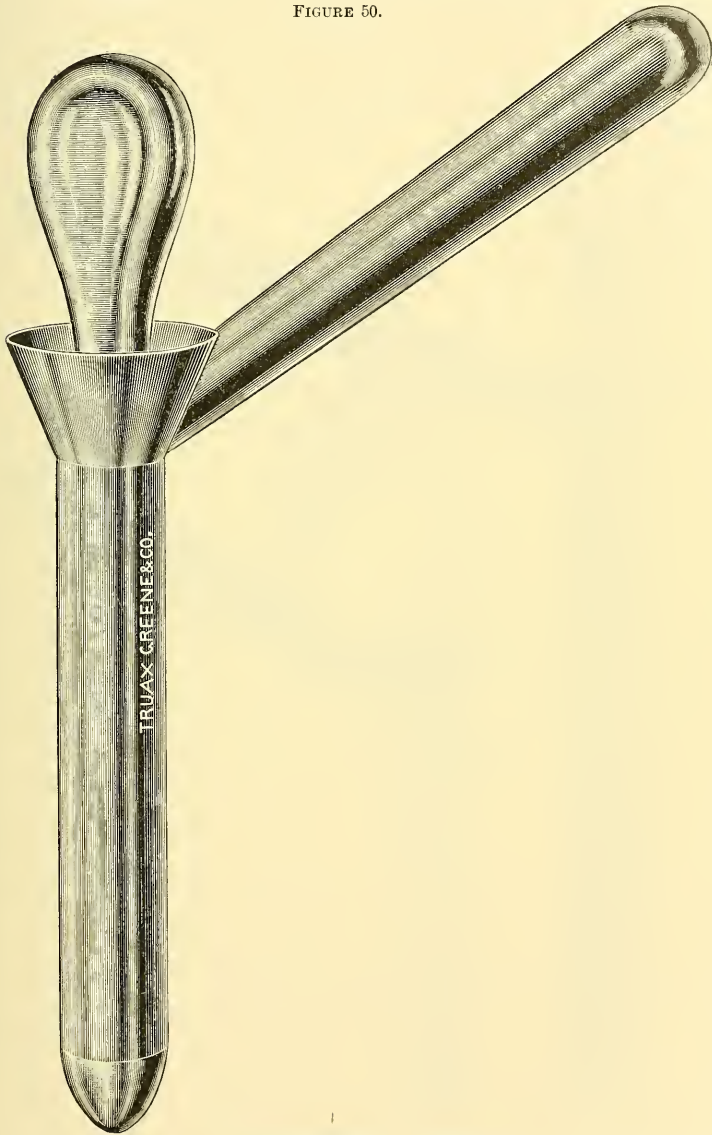
Numerous instruments have been devised for the inspection of the interior of the bladder. It is the great merit of Dr. Howard Kelly to have popularized and perfected an effective and satisfactory means of intravesical inspection. The following is an adaptation from the description given by Dr. Kelly.<sup>1</sup>

<sup>1</sup> Diseases of the Female Bladder and Urethra. Johns Hopkins Hospital Bulletin, November 1893. American Journal of Obstetrics, January, 1894.

The essential features of the method are:

1. Atmospheric dilatation of the bladder induced by posture.
2. Introduction of a simple straight speculum without fenestrum.

FIGURE 50.



No. 16 cystoscope. Actual size.

3. Examination of the interior of the bladder and urethra by reflected light.

The instruments required are:

1. A good light and a head mirror.



2. A urethral dilator, Figure 42.
3. A vesical speculum with an obturator, Figures 50, 51, and 52.
4. A suction apparatus to empty the bladder, Figure 44.
5. A long mouse-tooth forceps, Figure 48.

FIGURE 51.

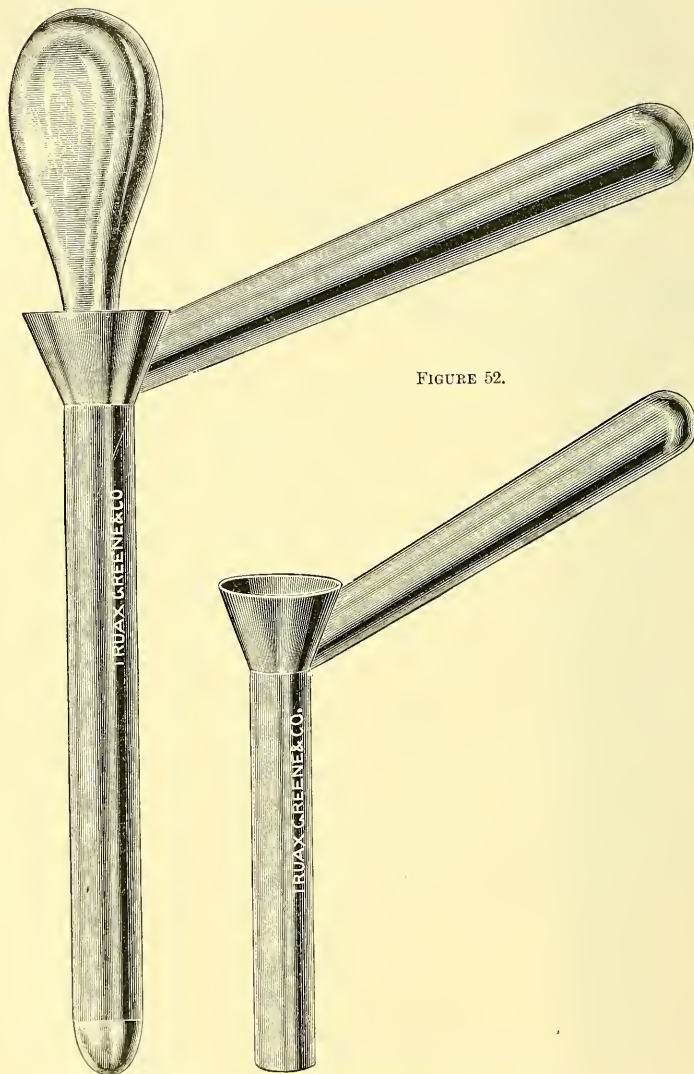


FIGURE 52.

No. 10 cystoscope. Actual size.

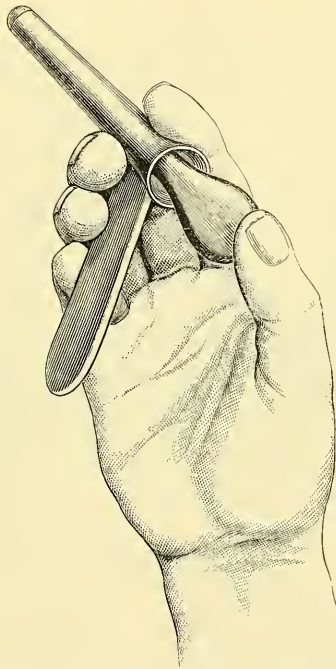
Cystoscope without obturator.

6. A searcher for discovering the ureteral orifice, Figure 46.
  7. Two ureteral bougies.
  8. Two ureteral catheters.
- The speculum in most common use has a diameter of one centi-

metre. If urethral dilatation to this extent is painful, one may produce local anæsthesia by the application of a 10 per cent. solution of cocaine. This may be applied within the meatus on a uterine applicator wound with cotton. In cases requiring more dilatation and in very nervous cases general anæsthesia, especially in the first examination, may be necessary.

The full special set of numerous graduated instruments formerly used to dilate the urethra is unnecessary. Stretching of the meatus by the conical dilator alone has been found sufficient.

FIGURE 53.

Hand holding cystoscope in act of introduction.<sup>1</sup>

A full set of specula comprises various sizes ranging in diameter from 5 mm. to 20 mm.—one-fifth to three-quarters of an inch. The latter, according to Simon, is the outside limit of safe dilatation. For some urethras it is doubtless beyond the limit.

The position of the patient is the chief essential. It may be the dorsal or the knee-breast position. Figures 54 and 56.

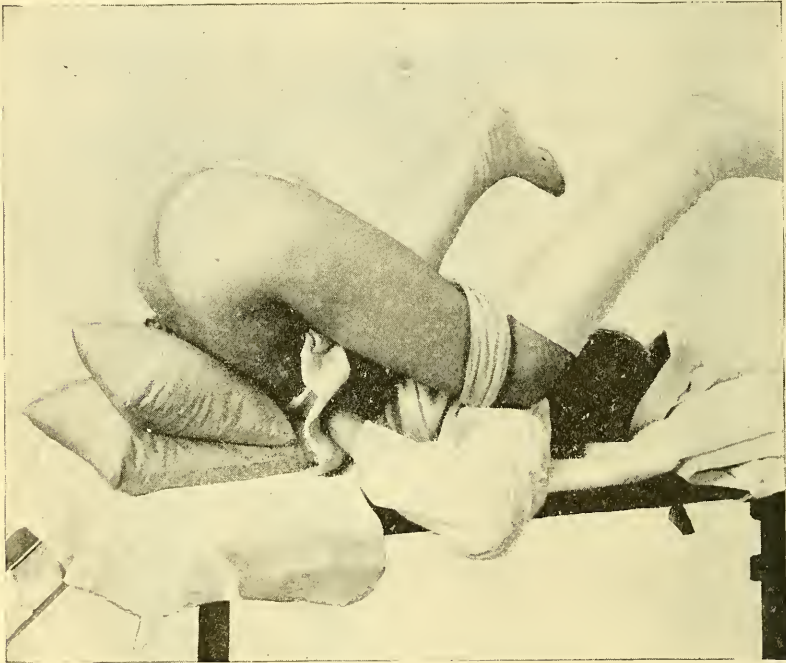
Examination in the dorsal position requires the hips to be elevated about twelve inches above the plane of the table. The speculum now being introduced through the urethra, the air rushes in and balloons the bladder. The residual urine must be removed by means of the suction apparatus. The entire interior of the bladder may then be ex-

<sup>1</sup> Kelly. Diseases of the Female Bladder and Urethra. Twentieth Century Practice, p. 630.

amed by light reflected from a head mirror. The examination is best made in a dark room by artificial light. The argand burner or electric light is quite serviceable.

The extent of surface seen at one time will depend upon the distance of the eye from the cystoscope, also upon the diameter of the instrument and its nearness to the field of vision. By sweeping the cystoscope from side to side, up and down and around, all parts may be rapidly and successively brought to view. One may observe and identify a wide variety of pathological conditions, such as neoplasms, inflammation, ulceration, scars, dilated vessels, discoloration, and foreign bodies.

FIGURE 54.

Dorsal position. Elevated pelvis.<sup>1</sup>

The most significant points for observation are the trigone and the openings of the ureters.

To expose the trigone, withdraw the speculum until the mucous membrane of the inner extremity of the urethra begins to close over it, then advance it and slightly depress the outer end. The mucosa at this point is usually of a dark-pink color in contrast to the lighter glistening appearance of the surrounding surfaces.

To expose the ureters, let the end of the speculum project into the bladder one centimetre with its handle raised. The inter-ureteric ligament may now in some cases be seen by its slightly raised transverse

<sup>1</sup> Kelly. Diseases of the Female Bladder and Urethra. Twentieth Century Practice, p 676.

fold or by its distinct difference in color. A ureteral orifice should now be seen by turning the speculum about thirty degrees to either side. By continuous watching, little jets of urine will be seen to spurt from the ureteral opening at intervals of about a minute. The appearance about the ureteral opening is variable. It may only be recognized by the periodic spurts of urine. It may be seen with the greatest difficulty only as a fine slit in the mucosa. The opening may be in a slight depression—a pit or dimple. In some inflammatory cases the opening may be through an eminence of soft granular tissue or through the

FIGURE 55.

Introducing searcher into left ureteral orifice.<sup>1</sup>

apparently everted ureteral mucosa. If the ureteral orifice is in view, the searcher will readily pass an inch or more into the duct. The ureteral catheter on one or both sides may now be introduced, and the urine taken directly as it flows from the kidneys. This may insure unerring diagnosis of the condition of either kidney. If the question of the removal of one kidney is under consideration, it is clearly of the greatest advantage to know the exact or approximate condition of the other.

The beginner will often have great difficulty in finding the ureter.

<sup>1</sup> Kelly. Diseases of the Female Bladder and Urethra. Twentieth Century Practice, p. 683.



Even the experienced surgeon often fails. The difficulty, however, always decreases with intelligent practice.

**Examination in the Knee-breast Position.** In many cases, especially of stout women, in which the bladder does not readily balloon with air in the dorsal position, it will do so in the knee-breast position. Figure 56 shows the ordinary knee-breast position. Figure 57 shows this position modified. This modification, with the buttocks directly

FIGURE 56.



Knee-breast position. Cystoscope introduced. Sound shows position of anal orifice.<sup>1</sup>

over the calves of the legs or ankles, instead of vertically over the thighs, has been found by Kelly in difficult cases to yield better results.

The examination is conducted on the same principles as in the dorsal position. For examination in this position the end of the cystoscope is cut off obliquely instead of transversely.

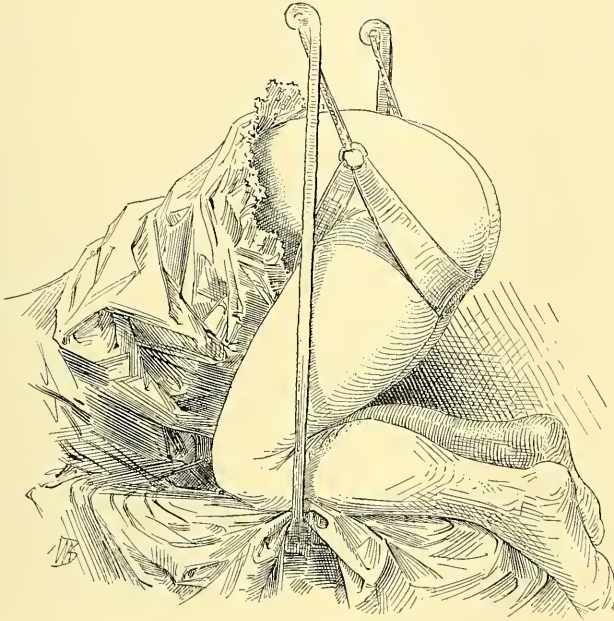
#### Exploratory Incision.

When other means of diagnosis fail, and it is necessary to examine the pelvic or abdominal organs directly by touch or by sight, the

<sup>1</sup> Kelly. Diseases of the Female Bladder and Urethra. Twentieth Century Practice, p 678.

surgeon will for that purpose open the peritoneum by exploratory incision. The incision is made either through the vagina—vaginal section—or through the abdomen—abdominal section. The incision having been made, the finger is introduced, and the diagnosis made by direct touch. The abdominal section may, if necessary, be enlarged

FIGURE 57.



Modified knee-breast position, often yielding better distention of bladder than with thighs vertical.<sup>1</sup>

so as to bring the pelvic and abdominal contents into view. Simple touch, however, through an incision only large enough to admit the finger is always safer and usually gives more information than visual examination. All vaginal and abdominal sections should be first exploratory. These sections are described in the chapter on the Treatment of Pelvic Inflammation.

<sup>1</sup> Kelly. Diseases of the Female Bladder and Urethra. Twentieth Century Practice, p. 679.

## CHAPTER IV.

## LOCAL TREATMENT.

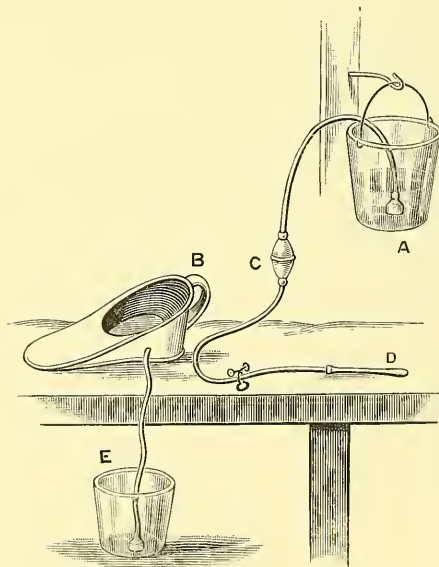
THE principal procedures in local treatment are these :

1. The hot-water vaginal douche.
2. Tamponade.
3. Topical applications.

## 1. The Hot Vaginal Douche.

The choice of the syringe, the frequency of the douche, the time and length of each application, the temperature of the water, the proper use of the bed-pan, the position of the patient, the persistence in long continuance of the treatment are all more or less essential to good results.

FIGURE 58.



Lord's douche apparatus.

The small fountain-syringe, in general use, requires refilling several times during the application of the douche, and is therefore inadequate. The common bed-pan, since it must be frequently emptied, is open to a similar objection. A simple device, known as Lord's<sup>1</sup> douche apparatus, is free from both of these defects. See Figure 58.

It consists of a bucket, A, large enough to hold two or three gallons

<sup>1</sup> Dr. F. H. Lord, Plano, Illinois.

of water, suspended on a hook about four feet above a couch on which rests the large bed-pan, B; a soft-rubber siphon, A, C, D, having at A a weight heavy enough to retain that end of the siphon in the bottom of the bucket A, an ordinary soft-rubber syringe-bulb at C, a device for shutting off the current between C and D, and a female syringe-tube at D. Another rubber tube is attached to an opening in the bed-pan and leads to the bucket E.

**Directions.** The bucket A is to be filled with water of the proper temperature, the shut-off being closed, the patient to be placed upon the bed-pan in the proper position, the tube D to be inserted into the vagina as far as it will pass, the bulb C to be compressed once or twice, and the shut-off opened. Then the water will flow through the siphon without compression of the bulb, fill the vagina, overflow into the bed-pan, and pass thence into the bucket on the floor below. Commonly it may be more convenient to place bucket A upon a shelf than to suspend it. The couch should be of some unyielding material, otherwise the bed-pan will settle so low as to prevent the drain of water into bucket E.

The following is designed to impress the importance of strict observance of detail in the application of the douche. In no other manner will its good effects be realized :

*Ordinary method of application.*

I.

Ordinarily the douche is applied with the patient in the sitting posture, so that the injected water cannot fill the vagina and bathe the cervix uteri, but on the contrary returns along the tube of the syringe as fast as it flows in.

II.

The patient is seldom impressed with the importance of regularity in its administration.

III.

The temperature is ordinarily not specified or heeded.

IV.

Ordinarily the patient abandons its use after a short time.

*Proper method of application.*

I.

It should invariably be given with the patient lying on the back, with the shoulders low, the knees drawn up, and the hips elevated on a bed-pan, so that the outlet of the vagina may be above every other part of it. Then the vagina will be kept continually overflowing while the douche is being given.

II.

It should be given at least twice every day, morning and evening, and generally the length of each application should be not less than twenty minutes.

III.

The temperature should be as high as the patient can endure without distress. It may be increased from day to day, from 100° or 105° to 115° or 120° Fahr.

IV.

Its use, in the majority of cases, should be continued for months at least, and sometimes for two or three years. Perseverance is of prime importance.

A satisfactory substitute for the bed-pan may be made as follows : Place two chairs at the side of an ordinary bed with space enough between them to admit the lower bucket; spread a rubber sheet over the side of the bed so that one end of the sheet may fall into the bucket below in the form of a trough. The douche may then be given with the patient lying across the bed, the hips resting over the edge of the



bed and one foot on each chair. The water will find its way along the rubber trough into the bucket below.

**Modes of Action.** The douche acts in a twofold way:

1. As a vasomotor stimulant.
2. As a cleansing agent.

1. **Vasomotor Stimulant.** Emmet, the strongest advocate of the douche, attributes its good effects to the stimulating influence of the hot water on the vasomotor nerves. These nerves are stimulated, he says, by reflex action, and the dilated congested vessels are thereby made to contract. In this way congestion is said to be lessened, absorption of morbid products is hastened, and local nutrition improved.

2. **Cleansing Agent.** The vagina in pelvic inflammation is a passage-way and to some extent a receptacle for pathological secretions. These secretions flow into it from the uterus, the Fallopian tubes, pelvic abscesses, and from the vaginal mucous membrane itself. Unless kept clean, the vagina may become an incubator and a distributing point for bacteria. The value of the douche, therefore, as a means of asepsis, is self-evident. When local disinfection is required, the hot-water douche may have in solution some antiseptic substance, such as lysol, carbolic acid, corrosive sublimate, boric acid, salicylic acid, or peroxide of hydrogen.

The indications for the douche, as suggested in the foregoing paragraphs, are chiefly in the treatment of chronic pelvic inflammations. The power of heat to stimulate and contract bloodvessels makes the douche also useful in the treatment of uterine hemorrhage. The prevailing disposition to extend its use to the routine treatment of all pelvic disorders should be discouraged.

There are constantly present in the normal vagina great numbers of lactic acid bacteria whose function is to render the vaginal secretion acid, and therefore to make it an unfit culture-ground for about 90 per cent. of all pathogenic bacteria. The washing out of these normal germs and their acid secretion necessarily makes the vagina a less difficult barrier for disease germs to pass, and therefore opens the way for infection in the higher zones of the pelvis. The indiscriminate routine use of the douche in the normal vagina is for this reason of questionable propriety.

## 2. Tamponade.

The principal indications for tamponade are:

1. Inflammation.
2. Hemorrhage.

1. **Inflammation.** Tamponade in the treatment of inflammation is designed, according to the indication and manner of application, to fulfil one or more of three purposes. It may be used: A, as a means of pressure; B, as a vehicle for the application of medicinal substances; C, for drainage.

A. The pressure effect of the tampon is chiefly useful in the treatment of displacements, especially displacements due to inflammatory causes. The subject will be further discussed under the head *Pelvic Inflammations and Displacements*.

B. As a vehicle for the introduction of medicaments the vaginal tampon has become a routine factor in gynecology. It is most frequently used as a carrier of glycerin. The object sought is to cause a watery discharge from the genital tract, and thereby to deplete the vessels and overcome congestion. Good results have often followed this treatment. How far they should be attributed to the tamponade, and how far to the curative forces of nature, or the associated systemic treatment, is often difficult to say. If the tampon is left in for more than twenty-four hours it becomes offensive, and may be a hot-bed of infection; hence, if used at all, it should be renewed daily, or at least should be removed on the day following its application. Its indiscriminate use as a routine measure, though less harmful than intra-uterine medication, should be discouraged; its therapeutic value has been much overestimated.

C. Drainage of the endometrium for endometritis, by means of the intra utrine tampon of aseptic or antiseptic gauze, has been with many a favorite means of treatment. See chapter on Treatment of Endometritis.

2. Hemorrhage. Hemorrhage from the vagina may often be controlled by means of a tight vaginal tampon. It is, however, better to find the bleeding-point and secure it by more definite surgical means.

Uterine hemorrhage, whether from endometritis, uterine tumors, or abortion, may demand immediate control. The vaginal tampon is most commonly used for this purpose. It has two disadvantages, first, inefficiency—in bad cases it often fails; second, it is cumbersome. Great distention of the vagina by a large tampon interferes with the functions of the bladder and rectum, and is a mechanical cause of discomfort.

Intra-uterine tamponade is a most practical, comfortable, and effective treatment for uterine hemorrhage. It should be in the form of a continuous strip of aseptic or antiseptic gauze about two inches wide. The cervix having been exposed by a Sims' speculum and steadied by a vulsellum forceps, the strip is introduced by means of a slender dressing-forceps, sound, or some similar instrument. The secretions absorbed by the tampon decompose rapidly, and become a powerful source of infection; hence the gauze should be renewed daily or every two days.

Material for the Tampon. If elastic pressure is required, fine lamb's wool is superior to absorbent cotton. For other purposes the continuous strip of aseptic gauze is preferable to either.

### 3. Topical Applications.

Applications to the Uterus. "How many times have you permanently arrested a long-standing uterine discharge by means of topical applications to the endometrium?" is a question which the writer has put to scores of physicians of large practice. The object of the question has been to measure, if possible, the value of such local treatment as is commonly and extensively used in office practice—a treatment mostly directed to the uterus for the relief of endometritis and cervical

erosion. The replies have been most significant : in the vast majority of cases, "Not one, or very few."

Intra-uterine medication commonly results in failure and disappointment, for two principal reasons : first, it is often used in unsuitable cases ; second, even when the case be suitable, it is often improperly used.

Efficient intra-uterine medication requires that the medicinal substance be brought in contact with the uterine mucosa. Ordinarily it is carried into the endometrium when that cavity is full of uterine secretions. These secretions form a thick protective coating over the mucosa. The application mixes with and may exhaust its virtue in chemical combination with the secretions, but does not reach the diseased mucous membrane. It frequently occurs that the applicator at various points inflicts slight wounds upon the endometrium, and thereby opens the door to septic invasion. Pelvic infection may be the result. The treatment, unless carefully applied, therefore, may be dangerous.

The prerequisites to safe and efficient intra-uterine applications are : first, a clear indication and definite appreciation of what the application is to accomplish—that is, the case must be properly selected ; second, preparatory disinfection of the vulvo-vaginal surfaces and dilatation and washing out of the endometrium ; this is specially essential as a precaution against infection.

The Proper Selection of Cases will exclude, at least, three large classes of cases :

A. Those in which the increased uterine discharge is due not to local, but to general systemic disorders, such as cholæmia, malaria, diabetes, and gout. Under such conditions the remedy will be not local, but general, and the case will be referred to internal medicine. The disappearance of such a discharge during local treatment should be attributed not to the meddlesome applications, but to the associated systemic treatment or to the curative force of nature.

B. Those in which the parametria and other circum-uterine structures are infected, or in which there is a uterine or extra-uterine tumor, or some other anomaly which would render topical applications useless or dangerous. These cases will be referred to surgery. See Treatment of Endometritis, in Chapter XVII.

C. Those in which the uterine discharge is due to some non-infectious local irritant of non-bacterial origin, such, for example, as temporary uterine displacement from an overcrowded bowel or an overdistended bladder. When the local irritation is removed the disorder usually disappears.

The propriety of routine local treatment for another class of cases may be questioned, to wit, cases in which the uterine mucosa is the subject of uncomplicated bacterial infection, or if there be complications they are not such as to contra-indicate intra-uterine medication. If in this class of cases it is wise to introduce medicinal substances to the endometrium, the steps of procedure will have to be as follows :

1. The preparatory dilatation and cleansing having been made, expose the cervix by means of a speculum, preferably Sims'.
2. Seize the cervix by means of a small tenaculum, or tenaculum-foreeps, in the left hand, and hold the cervix steady.



3. With the right hand pass the applicator, wound with cotton, saturated with the required medicament, into the uterine canal.

Few patients will tolerate the necessary dilatation without anaesthesia; hence, intra-uterine medication thus restricted must cease to be an everyday routine office procedure. Within the limitations above outlined it rises to the dignity of a surgical measure, and is no longer a potent cause of pelvic infection. The general uselessness of frequent and long-continued uterine applications for this class of cases is more fully set forth in the chapter on the Treatment of Endometritis.

It follows from the above that a very large proportion of the women who were formerly made the subject of extensive intra-uterine treatment should be treated rather by medical or surgical means or by both combined. If they do not present well-defined indications for surgical treatment, they should be relegated to the field of internal medicine. The legitimate field for routine topical applications to the uterus is limited.

The use of bougies containing various medicaments, the introduction of intra-uterine suppositories, the injection of various fluids into the uterus, packing the endometrium with gauze, and other similar procedures will, according to their value, be presented, or omitted, under the treatment of special disorders.

FIGURE 59.



Emmet's silver applicator.

Applications to the vulva and vagina, including the vaginal portion of the uterus, are indicated for the cure or palliation of the various inflammatory affections of those organs. Ointments, lotions, douches, and strong caustics may be applied precisely as they would under similar conditions to other parts. See Treatment of Vulvo-vaginitis, Chapter XI.

Direct treatment to the urethra, bladder, and ureters is discussed in Chapter XXIV., on Inflammation of the Urinary Organs.

Other forms of local treatment, such as scarification, leeching, and electricity will, according to their merits, be presented in connection with special subjects.

## CHAPTER V.

### MINOR OPERATIONS.

THIS subject involves a consideration of the preparatory treatment, the operating-table, anaesthesia, instruments, appliances, sutures, ligatures, dressings, the time and place of operation, assistants, operative technique, and after-treatment.



### Preparatory Treatment.

The preparation for an operation, largely a matter of antiseptics and asepsis, is set forth in Chapter II.

Faulty nutrition from any cause, such as syphilis, gout, rheumatism, nephritis, diabetes, and purpura, may interfere with the success of an operation, and may therefore call for systemic and hygienic treatment.

### Operating-tables.

For vaginal operations the table should be approximately forty-eight inches long, twenty-four inches wide, and twenty-seven inches high. Operations in private houses are usually performed on the common kitchen table or laundry table, or upon the narrow dining-table. This table, with the leaves folded, when covered with a blanket or quilt, fulfils the ordinary requirements. The length should not be greater than given above, for when the thighs are flexed and the patient drawn toward the operator the head should not be too far from the anæsthetizer, who stands at the end of the table opposite the operator. While the patient is being anæsthetized the feet and legs may rest temporarily on a chair or small stand at the foot of the table. This is removed when the thighs are flexed, just before the operation begins.

Clover's Crutch is one of the best of numerous devices to hold the thighs flexed and the legs in position during those vaginal operations which are done with the patient in the dorsal position. Such an apparatus is convenient, but unnecessary. The knees may be readily held by two assistants, one on each side.

Acute synovitis of the knee-joint followed by ankylosis has occasionally been observed to follow vaginal operations. This was unexplained until Dr. E. H. Webster, of Evanston, Illinois, suggested that an assistant, while holding the thighs in this flexed position, might carelessly throw his weight upon the leg, or lean heavily upon it, and thereby flex the joint to a dangerous degree.

All gynecological tables, whether used for examination or operation, should be made, as suggested in Chapter III., with an inclination of three or four inches, the foot of the table being to that extent above the head.

The accessories to the operation table include knee-rests, rubber sheets, and smaller tables for instruments, dressings, and ligatures.

### Anæsthesia.

In the absence of heart or kidney lesions the operator, according to his individual preference, will be justified in the choice of chloroform or ether. Chloroform in the case of kidney disease and ether in heart disease are generally preferred. Minor operations under cocaine should be undertaken only with great caution. The drug is dangerous. The choice and mode of administration of anæsthetics in gynecology follow, unmodified, the general principles of surgery.

## Instruments.

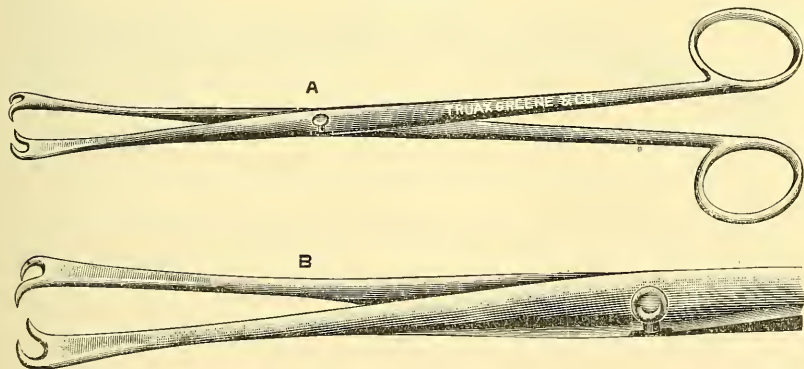
Sims' speculum and Simon's speculum have already been described in the chapter on diagnosis. For operations on the vaginal walls, such as the closure of vaginal fistulæ, repair of the lacerated cervix, division of the cervix, dilatation of the cervix, and curettage, Sims' speculum is regarded by all who have duly familiarized themselves with its use as incomparably superior to all others. See pages 61 to 67, Chapter III.

Simon's speculum, though for plastic vaginal work inferior to Sims' is yet a practical instrument. It has one advantage over Sims'—*i. e.*, the patient being in the dorsal position, on a Kelly pad or rubber sheet, see page 44, the operation may be done under constant vaginal irrigation.

Simon's instrument and the dorsal position are superior to Sims', and the latero-prone position for all operations in which the pelvic cavity is to be opened through the vagina, such, for example, as vaginal hysterectomy, vaginal salpingectomy, and vaginal ovariectomy. See Vaginal Section, Chapters VI. and XXIII.

Vulsellum forceps, similar in construction to those shown in Figure 60, are useful in various operations in the uterus and about the cervix.

FIGURE 60.



Vulsellum forceps Between the two teeth of each blade is a deep opening to accommodate the needle in the passage of a suture. The instrument has scissorshandles, and is about ten inches long.<sup>1</sup>

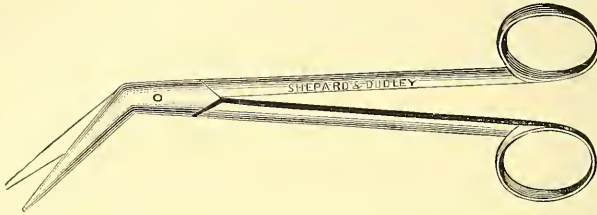
They serve to grasp and draw down the cervix, to grasp an intra-uterine tumor, to steady the cervix during the passage of a suture or during curettage.

Scissors. The minor gynecological operations may be performed either with the scissors or with a knife. The choice depends much upon the education and habits of the operator. The scissors cause less hemorrhage, and when one becomes accustomed to their use he can work more accurately and more rapidly. Any strong, well-made, slightly-curved scissors will suffice, but those of Emmet are pecially

<sup>1</sup> Modified from the pattern of Hanks.

adapted to intravaginal, perineal, and vulvar operations. Figure 61 shows a pair of blunt-pointed scissors, with straight blades bent laterally upon the shank at an angle of thirty degrees. They are useful

FIGURE 61.

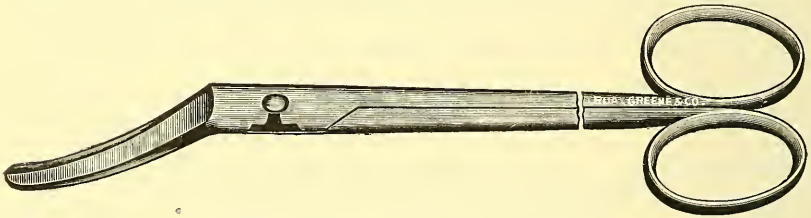


Emmet's scissors for dividing the cervix. Reduced size.

for dividing the cervix, for making an artificial vesico-vaginal or urethro-vaginal fistula, and for dividing cicatricial bands in the vagina.

The slightly- and strongly-curved scissors are almost indispensable for denuding in plastic operations; the slightly-curved, Figure 62,

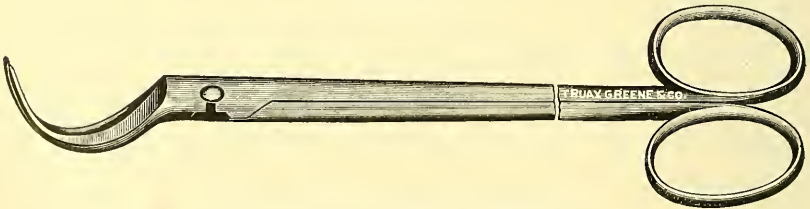
FIGURE 62.



Emmet's slightly-curved scissors. Reduced size.

are used for perineal and for ordinary intravaginal denudation; the strongly-curved, Figure 63, are convenient for denuding a strip high up across the vagina or cervix uteri in fistula and cervix operations. The scissors represented in Figures 62 and 63 are curved toward the

FIGURE 63.



Emmet's full-curved scissors. Reduced size.

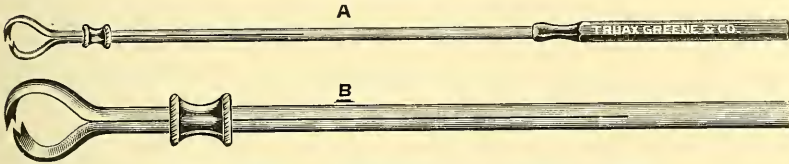
right, and are intended to be used with the right hand. Emmet mentions also two others, with curves to the left, but it is scarcely possible to imagine an operation in which the latter would be necessary.

Emmet's wire scissors, with blades pointed and slightly curved on the flat, are useful for removing sutures, and sometimes for cutting out

cicatricial tissue. The slightly-curved scissors, Figure 62, answer all the purposes for which straight scissors are usually employed.

**Sponge-holders.** For intravaginal operations it is well to have three or four or more sponge-holders, Figure 64, twelve inches long, in which sponges trimmed to the desired size and shape may be fast-

FIGURE 64.



Sims' sponge-holder. A. Reduced size. B. Section of full size.

ened. Ordinary hæmostatic forceps with long handles serve the purpose equally well, and, if gauze sponges are used, even better.

**Uterine Tenaculum.** Numerous tissue forceps have been devised for grasping the tissues to be denuded or excised, but a properly-constructed tenaculum in the educated hand is the most convenient and effective instrument for this purpose. With the tenaculum the operator can pick up and hold a smaller amount of tissue, and can therefore denude more superficially than is possible with the tissue-forceps. The instrument, Figure 65, has a perfectly straight hook a little more than a quarter of an inch long and at right angles to the shaft. It should be so strong and stiff that considerable force may be applied in the line of the instrument, without breaking or bending the hook, or in a lateral direction, without bending the shaft. The uterine tenaculum is useful not only in denudation, but also in almost every step of a gynecological examination or operation. In some operations as many as four of them may be required. The instrument is shown in Figure 65.

#### When to Operate.

Although it is a general rule not to operate during menstruation, it has by no means been proven that operations are more dangerous during this period. When menstruation is so long continued or so profuse as to endanger life or health, immediate operation may be imperative. The presence of menstrual fluid, however, is unfavorable, though not usually a bar to union by first intention in a cervix operation. An operation immediately upon the close of menstruation might cause it to reappear; if too near the anticipated period it might excite a premature flow. One may safely operate between the third day after the close of one period and the tenth day before the anticipated appearance of the next.

The question of primary or secondary operations after puerperal lacerations has been much discussed. Emmet's operation for laceration of the cervix, unless there be hemorrhage from the torn surfaces, should be delayed until after the puerperium, though a few cases of the immediate operation successfully performed have been reported. For laceration of the perineum, however extensive, the immediate



operation is desirable, for two reasons: The torn parts can be accurately adjusted to their former relations, which is almost impossible in the secondary operation; and the operation, if well performed, generally results in union, and thereby protects the patient against septic infection through the torn surfaces. The writer, therefore, would advise the primary operation of perineorrhaphy even as late as two days after delivery. He has repeatedly operated on the second and third days, and once on the ninth, and, with scarcely an exception, the delayed operation has resulted in satisfactory union. If, however, the primary operation has been delayed for a number of days, it is best, before introducing the sutures, to denude with the curved scissors a narrow strip all around the torn surfaces, in order that fresh surfaces may be brought together. A delay of a few hours after labor insures greater freedom from capillary oozing from the torn surfaces, which sometimes occurs after closure of the wound, and which may prevent union. Moreover, if anæsthesia be required, it is better to wait for permanent retraction of the uterus, otherwise the anæsthetic may cause relaxation and consequent uterine hemorrhage.

It is the duty of the accoucheur at the close of the puerperium to examine the uterus, vagina, and perineum, and to repair any puerperal laceration or injury before its evil results have developed. Operations may be necessary even during lactation. The child should be kept from the breast only until the mother has fully recovered from the anæsthetic.

Operations during Pregnancy should be restricted to cases of immediate and urgent necessity. Plastic operations, as a rule, may be deferred. Tumors connected with the reproductive organs, such as carcinoma of the cervix, ovarian cyst, uterine polypi, vaginal tumors, vulva, and rectal tumors, may have to be removed. The danger of abortion following operations during pregnancy is chiefly from possible sepsis—*i. e.*, from toxæmia; even the toxæmia from diffusible poisons and drugs, such as iodine, carbolic acid, bichloride of mercury, and quinine, may induce abortion; hence the use of such drugs should be limited and judicious.

**Multiple Operations.** When several operations are necessary, it may be proper to do them at one sitting. A rapid operator may safely perform dilatation of the uterine canal, curettage, trachelorrhaphy, elytrorrhaphy, perineorrhaphy, and the removal of hemorrhoids at one time. This amount of operating at one sitting would hardly be permissible for a slow operator or a beginner. The time of an operation should usually be less than an hour and a half or

FIGURE 65.



Uterine tenaculum.

two hours. Abdominal section or vaginal section is sometimes combined with plastic vaginal work. This combination, although at times permissible, is not generally approved.

### Plastic Operations.

This subject comprehends all operations for the repair of lacerations of the cervix and perineum, and of vaginal fistulæ; it also includes certain operations on the vaginal walls known as elytrorrhaphy, and numerous operations on the urethra, vulva, and anus.

A clear appreciation of the causes of failure will contribute to success in plastic surgery. Two principal causes of failure are, first, parts which never ought to be united are often brought together; second, faulty technique may result in failure of union.

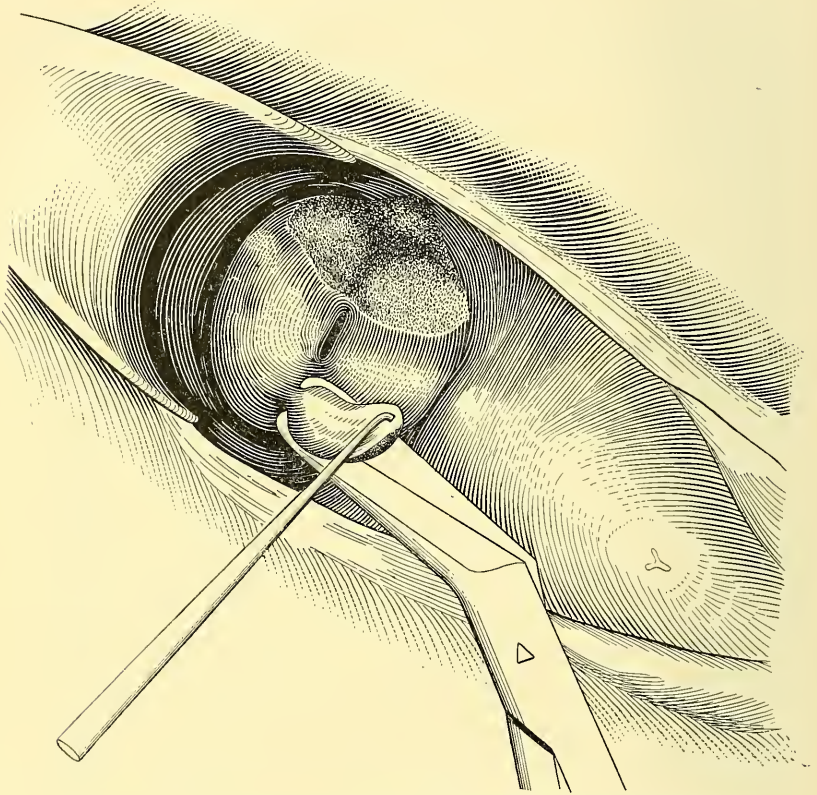
One of the most common bad results of the repair of the lacerated cervix uteri or perineum is the union of parts which were not together before the injury, and cannot be united without harm. A plastic operation which results in union is commonly called successful. If there has been union of wrong parts, actual harm may have been done. The flap-splitting operation of perineorrhaphy too often gives this result.

Union by First Intention will almost always result from a correct operation. True, in certain cases of vaginal fistula in which there has been great loss of tissue from sloughing, failures may arise from the cicatricial character of the parts or from difficulty in holding the edges together. Perineorrhaphy in very fat subjects, especially when the rupture extends through the sphincter ani muscle, may fail after the most skilful operation. Certain systemic diseases, among them diabetes, are unfavorable for union. Generally the conditions of success are within the control of the operator. These conditions are simple, but absolute, and the operator who has neglected them can neither fairly attribute his failure to the debilitated state of the patient, nor to chance, nor to accident. Indeed, union must almost invariably follow if the surfaces to be united are properly prepared and kept in contact for a week. The first condition, a sepsis, has been discussed. The others will be presented in the following paragraphs.

Denudation. The patient having been etherized, placed in position, and the field of operation exposed, the surfaces to be united should be denuded. Correct denudation is a prerequisite to healing by first intention. Surfaces to be united should be so denuded that when brought together they will fit accurately, otherwise a part of the denuded surface, being in contact with an undenuded surface, must heal by granulation and suppuration, which may excessively irritate the rest of the wound, and would always produce cicatricial tissue, which is very objectionable. The denuded surface should be smooth and free from shreds, which might die and become sources of septic infection. Every particle of membrane or skin within the area of denudation should be scrupulously removed. If the surface be perfectly healthy, the more superficial the denudation the better; but diseased and cicatricial tissues do not readily unite, and should therefore, when practicable, be removed.

Figure 66 shows the action of the tenaculum and scissors in denuding. The superiority of the tenaculum as a substitute for the tissue-forceps must become apparent to any one who will familiarize himself with its use.

FIGURE 66.



Denudation with the tenaculum and scissors. Figure 62 is a better illustration of the scissors here used.

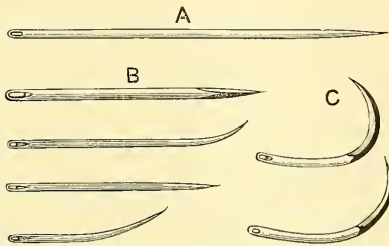
**Needles.** A round needle is preferable to one with a cutting edge. The latter makes an incised wound which is generally too large for the suture, bleeds more freely, is prone to suppurate, and requires more time for healing. The former makes a punctured wound which readily shrinks down upon the suture, is less liable to bleed or to suppurate, and heals more quickly after the removal of the suture. The tissue, especially in the cervix uteri, is, however, often so dense as to necessitate the use of a needle with a cutting edge.

Many of the most dexterous operators are partial to the straight needle in preference to the curved. The straight needle has two advantages: first, however deeply it may be buried in the tissues, the position of its point can always be determined from its direction and length; second, the force employed in its introduction being in the direction of the needle, it may without any danger of breaking be of



much smaller calibre than the curved needle, which must be introduced by a force exerted in the line of a tangent to the curve.

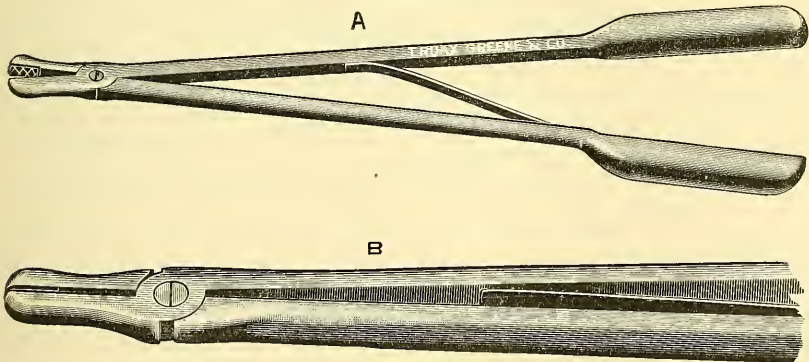
FIGURE 67.



A Straight needle for external sutures in perineorrhaphy. B. Straight and curved needles for operations on the vaginal walls and cervix, and for vesico-vaginal fistula; the upper needle under B is trocar-pointed for very dense tissues. C. Simon's strongly-curved needles for vesico vaginal fistula. The needle marked A would be better for general use, if made somewhat shorter and slightly curved at the point. The second needle under B is best suited for cervix and perineum operations.

The straight needle, in a word, requires less force for its introduction, is less liable to break, and makes a smaller wound. Moreover, the simple rotation of the needle-forceps on its long axis by a turn of the wrist enables the operator to sweep the straight needle around a curve in the vertical plane, or it may be carried around a curve in the horizontal plane by loosening and tightening the forceps grasp upon the needle at very short intervals, so that the angle between the for-

FIGURE 68.



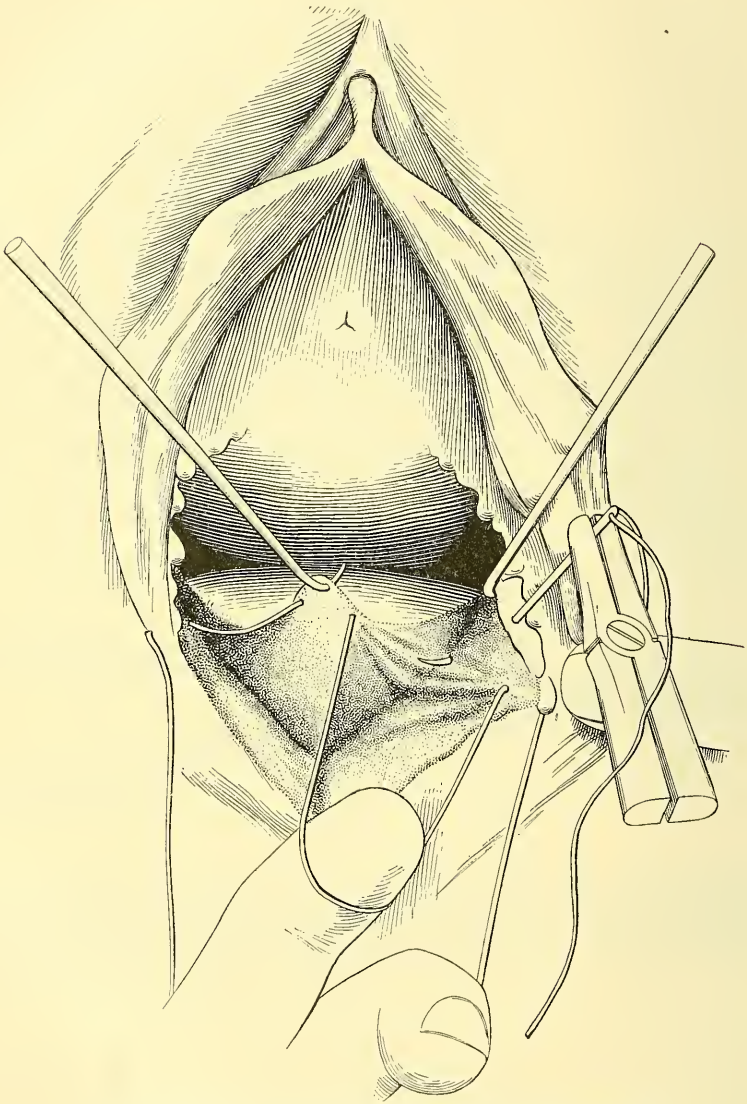
Emmet's needle-forceps. The spring between the handles causes them to open when the grasp is relaxed. A. Reduced size. B. Section of full size.

ceps and the needle may change almost constantly during its passage. In this way the straight needle may be made to carry a suture around a curve more accurately than the curved needle, and often more easily. Obviously, the lock forceps, which do not permit of this freedom of motion, are unsuited to such manipulations. Figure 68 represents Emmet's needle-forceps without lock. The eye of the needle, if included in the grasp of the forceps, may be crushed; to avoid this, grasp



it on the proximal side of the eye. The plain, round point, however sharp, sometimes encounters great resistance in being passed through dense tissue. The trocar point represented in Figure 67, or the sad-

FIGURE 69.



The introduction of a threaded needle to close a lacerated perineum.

bler's point, is less objectionable than the cutting edge, and may be introduced almost as easily.

Various needles with handles attached or detached, and of different

curves and shapes, have been devised, some with eyes at their points, some without eyes, and others of cylindrical form, through which the suture is passed lengthwise from one end to the other. They complicate rather than simplify the operation; they make punctured or incised wounds many times larger than the sutures which they are to contain; they are in no respect superior to the simple needle and thread.

**The Application of Sutures.** The most practical materials for sutures are silkworm-gut and catgut. The peculiar advantages of each will be presented in the description of the special operations. Before the introduction of the sutures, approximate the denuded surfaces with tenacula to determine whether they are of such size and shape that their union will produce the desired result, and whether accurate coaptation of their margins can be secured without undue traction, which might cause the sutures to cut out. Then hook up the margin of the wound with a tenaculum, introduce the needle, and apply counter-pressure as in Figure 69, until the needle can be seized and drawn through with the forceps. Some operators use the blunt hook for counter-pressure; but a strong tenaculum which will neither break nor bend is often preferable, because it may also be fixed in the tissues at the very point where the operator desires to force the needle through, and it thereby insures greater precision in directing the needle to its point of exit. The use of the tenaculum also avoids multiplicity of instruments.

Uterine tissue is often so dense that great force is required to drive the needle through it. For this reason the passing of the needle is often the most trying part of trachelorrhaphy.

In making counter-pressure the tenaculum may slip and the uterus receive a violent and sudden jerk, which is not without danger, especially when often repeated. This may be avoided and the operation facilitated by holding the flap in the vulsellum forceps, Figure 60, while the needle is being forced through between its teeth. These forceps may be made by filing the teeth of Hanks' forceps shorter and finer, and by filing a deeper opening between the two teeth of each blade. The sutures should be about one-fourth of an inch apart, should include considerable tissue, and, if possible, should pass entirely under, not through, the denuded surface, so as not to be in contact with any portion of the wound. When at a distance from the denuded surface, they are less liable to irritate and produce swelling and inflammation, and are therefore less liable to cut.

The tying of the sutures should be done with the greatest care. The thread should be drawn just tightly enough to hold the denuded surfaces in contact. If drawn too tightly the tissue will become strangulated and swollen, the sutures will cut out, the tissue will inflame, and the operation may fail. It is also important that the surfaces be brought into accurate contact, so that denuded surface may be against denuded surface. In no place should mucosa or skin be against denuded surface.

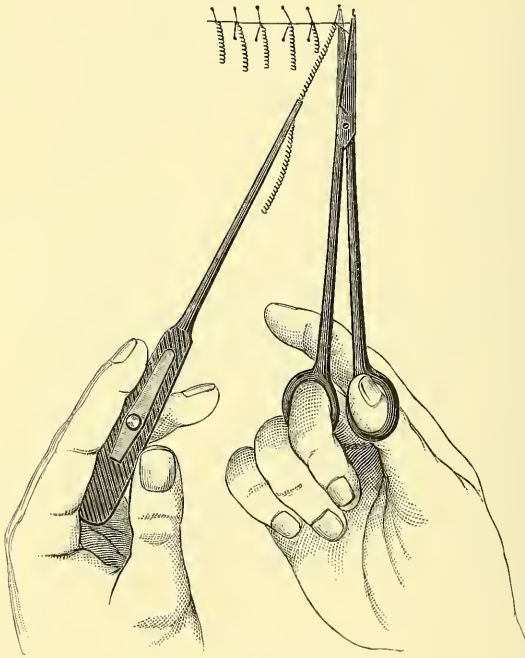
Before tying the sutures the bleeding should be stopped; otherwise small quantities of blood may accumulate in the track of the wound and serve as a mechanical bar to union or set up wound disease. The

advantages of a constant stream of hot, sterilized water playing on the wound during the tying of the sutures are self-evident.

The after-treatment will be presented under the special subjects. The field of operation is to be kept clean and immobile.

**Removal of Sutures.** Ordinarily the sutures should be removed at the end of a variable period of ten to fifteen days; if suppuration occur, earlier. Sutures about the vulva and perineum should be removed in about ten days. If left much longer they may become loose or cause suppuration. In the vaginal walls they may be left several days longer. In the cervix, where suppuration seldom occurs, they should be removed in about two weeks, unless perineorrhaphy

FIGURE 70.



Removing a suture.

has been done at the same time, in which case their removal cannot safely be undertaken in less than three or four weeks. To remove a suture seize the free end with a forceps, and with the scissors cut the nearest side of the loop. See Figure 70. Cutting the nearest side tends to hold the freshly-united wound together during the withdrawal of the suture; if the loop were cut on the farther side its removal would tend to reopen the wound. It is well to seize with the forceps only one of the free ends, for the other would then be available in case this one were accidentally cut off. Always make sufficient traction to bring the loop in sight before cutting, otherwise one may cut both sides off below the knot and leave the loop. If

then the ends of the loop retract, as they usually do, its removal is extremely difficult; it may remain indefinitely and keep up a constant suppuration. Its final removal may necessitate anæsthesia and an incision.

**Assistants.** Four assistants are usually required for a gynecological operation—one to give the ether, one to wash sponges, one at the operator's left, to hold the speculum, and one at the operator's right, to sponge and render other assistance. If the operation be on the perineum or vulva, and the patient be in the dorsal decubitus, the thighs must be flexed and held in the lithotomy position by the two assistants on the right and left. The assistants in charge of the ether and sponging should be physicians. The washing of sponges, holding of the speculum, and threading of needles are better done by nurses.

### Dilatation of the Uterus.

It is impossible, save in exceptional cases, by any speculum yet devised to inspect the interior of the uterus. Its cavity may, however, be made surgically accessible to the examining finger or to instrumentation by dilatation. The indications for dilatation may be diagnostic or therapeutic, or both. Among these indications are stenosis or stricture of the canal, uterine hemorrhage due to endometritis, neoplasms, or abortions, and pathological antelexions. The means and methods are these:

1. Incision.
2. Tents.
3. Graduated sounds.
4. Instruments of diverging blades.

1. Incision of any portion of the uterine canal may be required to render the endometrium accessible for instrumental or manual interference. But incision is especially applicable to the lower part of the cervical canal and to the external os, and is performed for congenital or acquired stenosis. Its object is to insure the free outflow not only of menstrual fluid, but also of the uterine mucus, which if retained becomes offensive, irritates the uterine mucosa, and causes hypersecretion. Oftentimes the uterine secretions are so impeded in their passage through the strictured os internum or externum that they accumulate, distend the uterine cavity, and are thrown off at irregular intervals with explosive pains simulating labor pains. This explains certain cases in which there is a recurrence in the intermenstrual period of all the painful phenomena of obstructive dysmenorrhœa.

Schroeder, in certain cases, especially of intra-uterine polypi, incises the cervix bilaterally, seizes the posterior lip with a vulsellum forceps, and, with his finger as a dilator, works his way to the uterine cavity. The uterus, dilated in this way and well drawn down, is very accessible. In Schroeder's method the lateral incisions extend into the dangerous neighborhood of the parametria. The safety of the operation must therefore depend upon thorough antisepsis. It is impracticable in a rigid uterus to incise and dilate according to Schroeder's method.

The author's method of rendering the entire uterine cavity and uterine

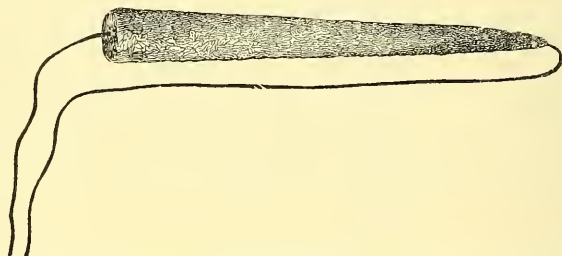


walls accessible for the removal of myomata through the vagina by free median incision of the anterior uterine wall is described under the Surgical Treatment of Myomata.

2. *Tents.* Sponge, tupelo, and sea-tangle are the materials commonly used. If introduced into the uterus in the dry, compressed state, the mucous secretions, stimulated by their presence, cause them to swell laterally to a diameter two or three times greater, and, correspondingly, to dilate the canal.

*Sponge-tents*, which have a dilating power of three or four times their diameter, are made of disinfected, compressed sponge, straight or curved to fit the uterine canal. They are perforated from end to end to admit a strong thread, see Figure 71, by means of which the tent may be held together during removal. Otherwise a fragment may be left behind and be an unsuspected source of dangerous infection.

FIGURE 71.



A sponge-tent with thread passing through it. Before introduction the ends of the thread should be tied together.<sup>1</sup>

The sponge-tent not only expands, but at the same time softens the walls of the uterus, and thereby prepares them for further dilatation, and renders the cavity more accessible for surgical interference; in this respect it is more effective than tupelo or laminaria, and much more effective than steel dilators, which usually leave the uterus so elastic that immediately after their removal the introduction of the finger or of an instrument for diagnostic or surgical purposes may be impossible without further dilatation. The softening effect is the result of excessive irritation, congestion, secretion, and hypersecretion due to the presence of the sponge. Under such conditions it may, in an incredibly short time, become offensive and dangerously septic from decomposition of the absorbed secretions. It often also becomes so adherent and incorporated with the intra-uterine membrane that portions of the epithelial layer may be stripped off with its removal. The surfaces thus exposed would furnish a ready avenue for absorption. Disastrous results seldom follow the application of a single aseptic sponge-tent unless the patient has suffered from a previous cellulitis or peritonitis, but the danger increases rapidly with the introduction of the second and third. Many operators now discard them altogether.

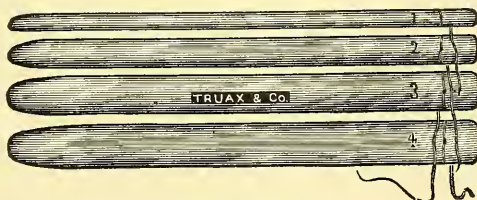
*Tupelo-tents*, made from the tupelo-tree (*Nyssa aquatica*), expand less powerfully, but more rapidly than sponge, to about double their

<sup>1</sup> Thomas on the Diseases of Women, p. 103, sixth edition.

compressed size, and, inasmuch as they do not so readily become offensive from decomposition of the absorbed secretions, they are less dangerous. They are straight and inflexible, and therefore not easily introduced in cases of acute flexion, especially when there is immobility at the angle of flexure. They are, however, very smooth, and slip into place when the canal is straight, or nearly straight, more easily than sponge. If the tent selected is found on trial to be too large, it need not be thrown away, but may be easily cut down to the required size with the penknife. A standard author has included among the many advantages of the tupelo-tent the possibility of recompressing it for repeated use; but, for obvious reasons, such a practice can be neither safe nor permissible.

*Laminaria-tents*, also called sea-tangle tents, have more expanding power than tupelo and less than sponge, but their action is so slow that they are liable to be expelled from the uterus before they have become sufficiently expanded to be self-retaining. They have but one advantage over the tupelo, which is their flexibility. After soaking in warm water for a few minutes they may be bent to any desired curve, and may therefore be introduced in cases of uterine flexure. Figure 72 represents four laminaria tents. They are perforated from end to end to make them dilate more rapidly, according to the recommendation of Dr. Greenhalgh, of London. Expansion of laminaria is very slow, requiring thirty-six hours for the maximum dilatation.

FIGURE 72.



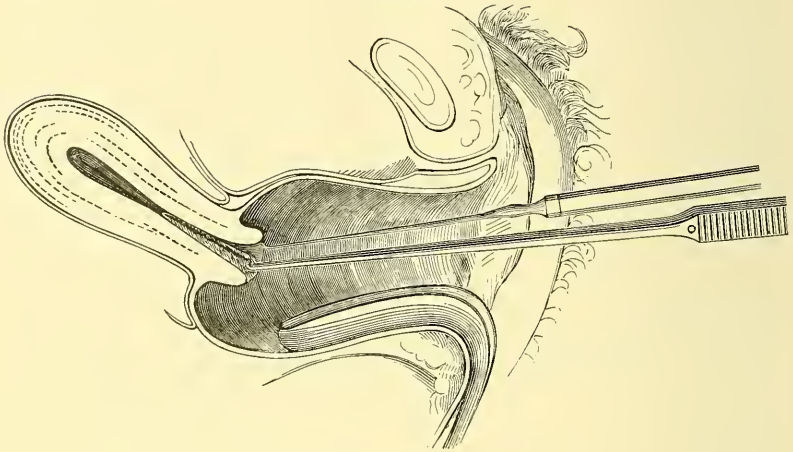
Sea-tangle tents.

**Introduction and Removal of Tents.** Unless the uterus be so low that the os externum is near to the vulva, a speculum will be required for the introduction of a tent. Sims' speculum is most suitable and, indeed, indispensable in difficult cases, especially when the uterus is much anteflexed or anteverted. Before introducing the tent the vagina and vulva should be thoroughly cleansed, the cervix exposed by the speculum, and the direction and curve of the uterine canal ascertained by the probe; then a tent of corresponding curve should be seized in the forceps and introduced while the cervix is fixed with a tenaculum, as shown in Figure 73. A small tampon of antiseptic cotton should then be placed against the cervix to hold the tent in place. The time required for a sponge or tupelo to reach its maximum dilatation is from six to twelve hours. Several small tents may be introduced at one time instead of a single large one.

The tent may sometimes be removed by traction on the attached thread, but when considerable force is required it is better to use the

speculum and forceps, and in making traction to use counter-pressure against the cervix, which may be steadied by placing two fingers against it, or by fixing it with the vulsellum forceps, or by encircling

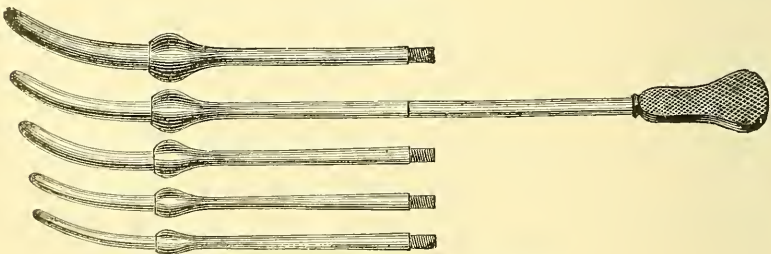
FIGURE 73.



Introduction of a tent. SIMS.

it with the fenestrated end of a Sims vaginal depressor. After the removal of the tent some blood usually flows from the intra-uterine surface. This surface is usually more or less abraded, especially if a spongetent has been used. The endometrium should therefore be thoroughly washed out with an antiseptic solution, to be followed with an application of Churchill's tincture of iodine over the entire uterine cavity. In cases requiring further dilatation the iodine should be omitted until the last tent has been removed. The danger of continuous dilatation by introducing one tent after another is very great. As already stated, the alarming results have generally followed the use of the second or the third tent, seldom the first. A tent should not be allowed to re-

FIGURE 74.



Peaslee's uterine dilators. Reduced size.

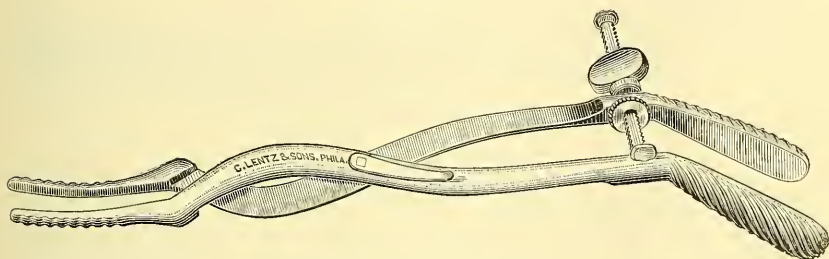
main in the uterus more than twenty-four hours under any circumstances, and generally not more than twelve. The tents furnished by instrument makers are not always aseptic. Before using them, there-



fore, it would be well to subject them to the dry-heat process of Boeckman, as described in Chapter II. for the disinfection of catgut.

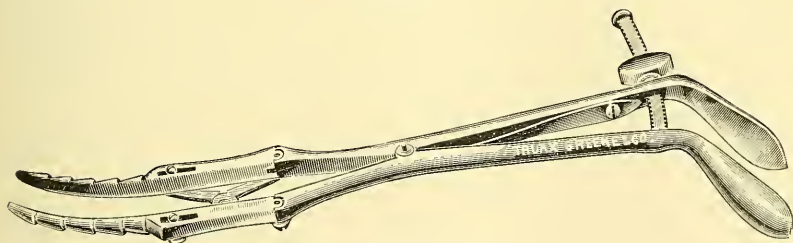
3. **Graduated Sounds.** The uterus, like the urethra, may be dilated by means of graduated sounds. Figure 74 shows Peaslee's uterine dilators. Peaslee, Hegar, and Hanks have devised similar instruments which are equally serviceable. They are particularly adapted to cases in which the abdominal walls are thin and lax, so that the uterus may be easily fixed by the hand over the abdomen, while one sound after another is forced into the canal until the required dilatation is accomplished. If the abdominal walls are thick and tense, it is necessary to use Sims' or Simon's speculum, and during dilatation to fix the cervix with the vulsellum forceps. In such cases the diverging instruments are preferable.

FIGURE 75.



Wathen's dilator. Reduced size.

FIGURE 76.



The Goodell-Ellinger dilator.

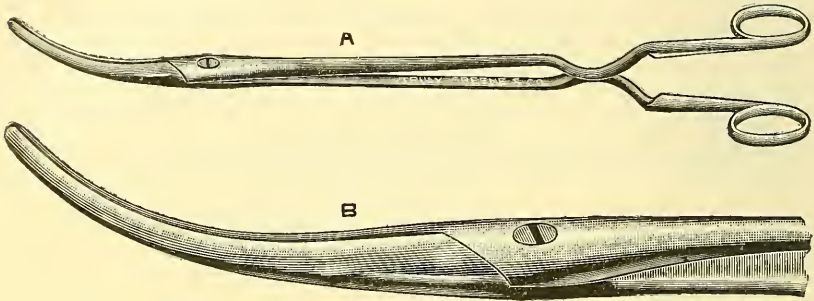
4. **Diverging Instruments.** Innumerable instruments have been devised with blades which diverge and dilate the uterus when the handles are pressed or screwed together. See Figures 75, 76, and 77.

Wathen's dilator and Goodell's modification of Ellinger's dilator have serrated blades to prevent them from slipping out during the process of dilatation; this accident is much more liable to occur with the latter instrument, on account of the parallel action of its blades, and notwithstanding strong counter-traction with the vulsellum forceps it does occur in many cases long before dilatation can be completed. The blades of the Wathen dilator diverge in a fan-like manner, and, since for this reason they do not slip out, are preferred. These dilators are generally too heavy to be inserted until the way has been opened by a lighter instrument like Palmer's, or by the



smaller graduated sounds, or by a tent. It is important that all instruments for powerful dilatation be supplied with the thumb-screw for screwing the handles apart. If the handles are compressed with the hand, rupture of the uterus is apt to occur. The smaller dilator of Palmer does not require the screw.

FIGURE 77.



Palmer's uterine dilator. A. Reduced size. B. Section of full size.

Dr. Goodell,<sup>1</sup> of Philadelphia, was foremost among the advocates of this method of dilatation. In a large experience with extreme dilatation under ether he had no fatal result and no serious inflammatory disturbance. He carried the dilatation to three-fourths of an inch in the thin-walled, unyielding infantile uterus, and to one and one-quarter inches in ordinary cases. In case of a rigid, unyielding, or thin-walled uterus, which might tear from rapid expansion of the dilating blades, it is better to commence dilatation with a sponge- or tupelo-tent, the softening influence of which renders the canal more easily and thoroughly dilatable by the forcible method.

The dangers are from traumatism and sepsis. There may be extensive rupture from over-distention by rapid dilatation of a rigid uterus. Dangerous hemorrhage, peritonitis, and death may result. A uterus ruptured by dilatation should be packed and drained by aseptic gauze. An abdominal or vaginal section may be necessary to control hemorrhage. The special dangers of dilatation by tents, and the impossibility of enforcing thorough antisepsis in their use, have been considered in a previous paragraph. It would, however, be a fatal mistake to suppose that antisepsis deprives dilatation by any method of all its perils. All manipulations of this class, says Fritsch, are dangerous, and not to be employed unless the indication is quite clear. Existing pelvic inflammation, acute or chronic, is a serious contra-indication. Indeed, the history of a majority of fatal cases includes previous cellulitis, peritonitis, or metritis. Dilatation, however slight, by any method, should be regarded as a surgical operation, should always be done at the patient's house or a hospital, never at the office, and should be followed by rest in bed for a time varying from one to seven days. Forcible dilatation, either by sounds or by diverging instruments, ex-

<sup>1</sup> American Journal of Obstetrics, 1884, p. 1179.

cept when the dilatation is to be slight, requires an anæsthetic. If there be tenderness about the uterus or other signs of inflammation, or if the patient has suffered from a previous infection, ice should be kept over the hypogastrium until the danger has passed. See Treatment of Pelvic Inflammation.

The special advantages of each method of dilatation may be summarized as follows :

**Incision.** Contraction of the os externum and lower portion of the uterine canal is best treated, according to the nature of the case, either by Fritsch's operation for enlarging the os externum by incision, or by Schroeder's operation of bilateral incision of the cervix. See Treatment of Cervical Endometritis.

**Tents.** Sponge-tents are the most dangerous, tupelo the least. Laminaria has but one advantage over tupelo, its flexibility and adaptability to a tortuous canal. In a case of rigid hyperplastic or thin-walled cervix not safely dilatable by rapid means, the tent is especially indicated as a means of preparation for rapid dilatation by graduated sounds or diverging instruments.

Graduated sounds and diverging dilators are generally the safest and most effective means of dilatation, and should have the preference unless the softening effect of the tent is specially desired.

One may combine the principle of graduated sounds in the use of diverging dilators. This requires a series of dilators of graduated sizes. The small instrument is first inserted, and the blades spread, the dilator next larger is then used in the same manner, and so on through the series. Before spreading the blades each instrument acts as a graduated sound ; as the blades diverge they act on the principle of the glove-stretcher. Four or more dilators are required, two of the Palmer or Nott pattern, and two of the Wathen variety.

A small light dilator as a means of complete dilatation has two disadvantages : first, the light blades may bend and fail to stretch the canal beyond a limited degree ; second, if they do not spring or bend they are apt to imbed themselves—that is, crush their way into the uterine walls. The result is not dilatation by stretching, but by tearing. The wound thus inflicted may be dangerous. This unfortunate result may be avoided by the use of a graduated series of instruments.

The technique of dilatation is simple : 1. Disinfect the vagina and vulva. 2. Expose the cervix by a Sims' or Simon's speculum. 3. Grasp the cervix firmly in the teeth of a vulsellum forceps. Figure 60. 4. Introduce the successive dilators and slowly screw the blades apart. 5. Wash out the uterine cavity with sterilized water from a fountain-syringe through a rubber tube and canula. The ordinary glass female catheter is a good canula. The dilatation should be sufficient to give a free return flow through a single canula, if the dilatation is not sufficient irrigation is usually contra-indicated ; hence the double-current canula is seldom required.

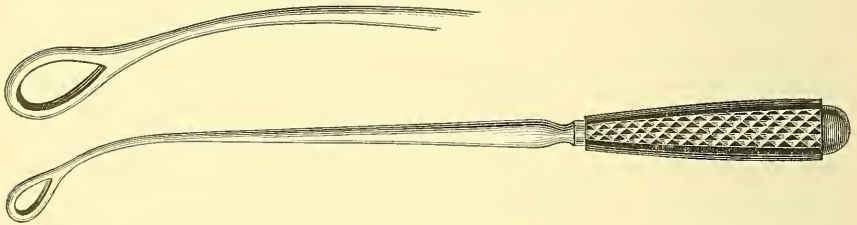
Salpingitis, sactosalpinx, and other forms of circumuterine inflammation may contraindicate dilatation.

## Curettage.

The diagnostic significance of the curette has been given in Chapter III. Its therapeutic purpose is the removal of diseased tissue or foreign bodies from the interior of the uterus. The symptomatic indications are usually hemorrhage, uterine discharges, or septicaemia due to some intra-uterine cause. The instrument was first used in 1843 by Récamier; it has passed through numerous modifications, and on account of its disastrous results—perforation of the uterus, metritis, salpingitis, cellulitis, peritonitis—it has received at times the severest censure, not wholly undeserved.

The dull curette, shown in Figure 78, is made of flexible copper wire. The loop at its extremity has slightly flattened, but not cutting edges; its shank may be bent like a probe to conform to the direction of the uterine canal. Whatever the force applied, it is not likely to injure the sound tissue, although it will remove loose foreign bodies, such as the secundines of an abortion.

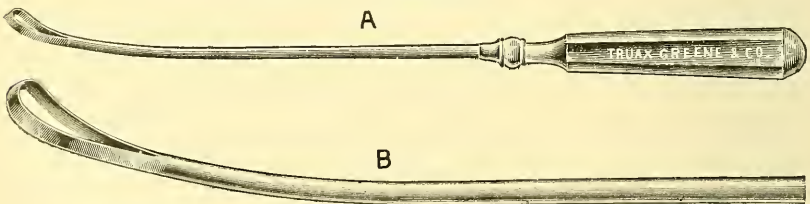
FIGURE 78.



Thomas's dull wire curette.

The sharp curette, shown in Figure 79, is designed to remove such diseased tissues as are more intimately connected with the uterus; for example, an infected endometrium, benign adenoma, and malignant growths. The loop is of steel, and has a sharp cutting edge. The shank is of flexible copper, and may be bent to conform to the direction of the uterine canal.

FIGURE 79.



Sims' sharp, fenestrated steel curette. A. Reduced size. B. Section of full size.

**Operation.** The steps of curettage are these. See Figure 36.

1. Previous dilatation through a speculum, preferably Sims', as above described, sufficient for the easy admission of the curette.
2. Steady the cervix with the vulsellum forceps and introduce the curette.



3. Should the object be to remove some foreign body, the dull curette will readily accomplish this if used like a rake. Little force is required. The sensation imparted to the fingers will show whether all the foreign substance has been removed—*i. e.*, whether the loop glides over a smooth surface.

4. If the object is to remove diseased tissue, the sharp curette should be used with a back-and-forth scraping motion round and round the endometrium. The operator will know when the tissue has been sufficiently removed, first, by the fact that no more comes away; second, by the sensation which the curette imparts to the fingers of a hard resisting, more or less healthy, intra-uterine surface.

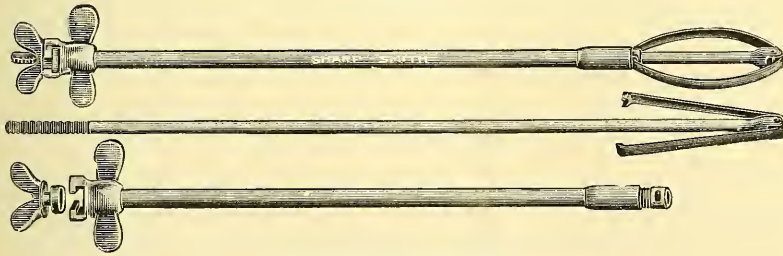
5. The diseased tissue having been scraped away, the endometrium should be washed out with sterilized water, as described on page 103.

6. If it is desirable to apply a medicinal substance, such, for example, as a saturated solution of iodine crystals in pure carbolic acid, this may be done by means of an applicator or a fine dressing-forceps wound with absorbent cotton. Before making the application, pack absorbent cotton under the cervix, to absorb any fluid which otherwise might run out, and irritate the vagina.

7. The after-treatment is rest in bed for a week, with vaginal douches twice daily of a one-half of 1 per cent. solution of lysol in sterilized water.

**Smith's Curette.** The instrument of Courtney L Smith, of Aurora, Illinois, is constructed on a novel and useful principle.

FIGURE 80.

Courtney L. Smith's curette.<sup>1</sup>

The main part of the instrument consists of two cutting or scraping blades, which can be stretched flat or bowed out in the form of an ellipse by a rod and screw. After dilatation of the cervix in the usual way, the closed curette is readily slipped up to the fundus. The screw is now turned. This separates the scraping blades, and draws the stretched uterine mucosa closely down upon them. Rotation of the instrument removes the diseased tissue, much or little being scraped away as desired. A backward turn of the screw straightens the blades, and the instrument is withdrawn.

An examination will now show that the space between the blades is filled with shreds of tissue brought out with the instrument. A plunge in sterilized water cleanses it. It may again be introduced slightly dilated, and given a turn or two and drawn out with the remaining

<sup>1</sup> Journal American Medical Association, August 14, 1897.



shreds. All the products of the operation are thus removed. Blood-clots are washed out by the irrigator.

The advantages claimed for the instrument are the following :

1. It is easily introduced and manipulated.
2. The uterine mucosa is curetted as the instrument is revolved.
3. As it is withdrawn all shreds of tissue are removed with it.
4. There being no sharp angles or points to go through softened tissues, there is no danger of perforating the uterine wall. The instrument is specially useful in cases which do not require the removal of a septic endometrium by sharp curettage.

This is especially a useful instrument for the removal of the secundines after early abortion.

Further technique for minor operations will be presented in connection with special subjects.

## CHAPTER VI.

### MAJOR OPERATIONS.

THIS chapter is a general consideration of those procedures which are common to the opening of the peritoneal cavity. Peritoneal section may be made through the abdominal walls or through the vagina; hence the subject is divided into

1. Abdominal section.
2. Vaginal section.

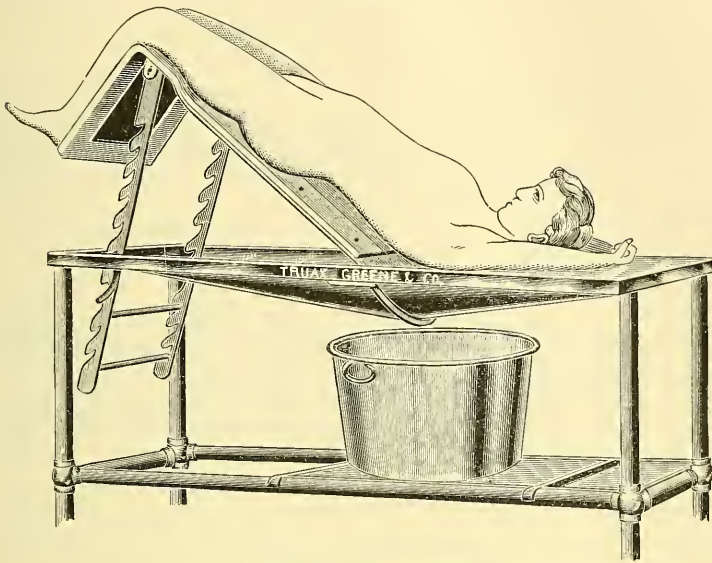
#### 1. Abdominal Section.

**Operation-tables.** The table already described for examination and vaginal operations will suffice for abdominal section, if lengthened so that the patient may lie upon it at full length. For this purpose a short table may be supplemented by a stand or another shorter table.

**The Trendelenburg Position.** A favorite table for hospital use, and especially for abdominal section, is that of Trendelenburg or one of its numerous modifications. The top of this table may, at any time during an operation, be readily adjusted to any desired angle, and by this means the hips may be so elevated as to cause the intestines to gravitate away from the pelvis toward the diaphragm. The surgeon may then gain, in favorable cases, an almost unobstructed view of the pelvic basin, and may work deep in the pelvic cavity unimpeded by the distended intestines. It is even claimed that he may proceed with the operation as readily as if it were on the external surface. Extravagant claims are made that this position makes pelvic surgery easy, so that an indifferent operator may safely undertake it. The table is useful during anæsthesia, when the pulse and respiration fail and it becomes desirable to elevate the lower extremities and lower the head. The forward flexure of the head upon the body as here shown may

impede respiration, and is therefore objectionable. This fact would suggest the use of an inclined plane upon which the head as well as the body may rest.

FIGURE 81.



Modified Trendelenburg table.

The advantages of this position, although admitted, are over-estimated; first, infectious fluids which escape during the operation are certain to gravitate toward the diaphragm, and may infect the general peritoneum; second, the field of operation in many cases is not rendered more accessible; third, the abdominal muscles are often made more rigid; fourth, with the patient on an ordinary table, large, flat sea-sponges, or gauze pads, may be used in such a way as to keep the intestines out of the way, and thereby to expose the deeper parts of the pelvis. The Trendelenburg position is useful, but not so useful as the enthusiast would imply. It does not overcome, but rather lessens a few—only a few—of the difficulties and dangers of abdominal surgery.

The Krug portable Trendelenburg frame is adapted to private practice, and is one of the most practical devices of its class. It is made of light material, covered with washable canvas, adjustable to an ordinary wooden table by means of clamps, and readily carried from place to place.

**Substitute for the Trendelenburg Table.** The end of a common table may be raised on a block or chair so as to give it the required slant. The patient then, with the legs falling over the foot of the table, may be readily adjusted to the desired angle without recourse to the more or less complicated Trendelenburg table.

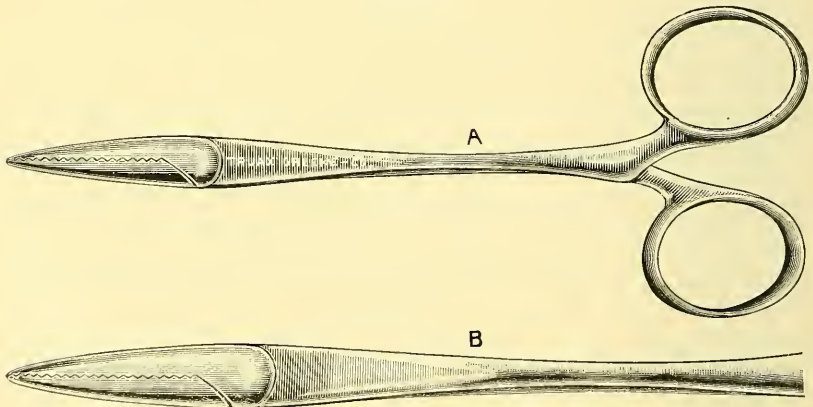
**The Preparatory Treatment.** The necessary antiseptic procedures to an aseptic result have been set forth in Chapter II. After the patient is on the table and under anæsthesia it is well to scrub the

abdomen again with the sterilized soap and water, then wash with clean water, and then with a 1 to 1000 solution of bichloride of mercury, and finally with ether. This is specially important in cases of acute pelvic suppuration in which thorough scrubbing before anæsthesia is not tolerated. The patient's clothing should be of light flannel—undervest, drawers, woollen stockings, and night-gown.

It is further important, before beginning a grave operation, that the various organs of elimination be sufficiently active, so that the danger of autointoxication from the retention of waste products may be reduced to the minimum. The demand made upon the patient by the operation itself reduces the eliminating capacity of these organs, sometimes to the point of danger; hence the imperative necessity of lightening their burden. Careful examination of the kidneys and heart may lead to essential preparatory treatment of these organs.

The Incision. The best surgeon usually operates with the fewest instruments. To open the abdomen one requires a scalpel, a few strong hæmostatic forceps, long and short, and a pair of strong, straight-bladed scissors. Twelve short and six long hæmostatic forceps will suffice for any operation. Sir Spencer Wells and others have reported cases in which, after the operation, hæmostatic forceps were found post mortem in the peritoneal cavity. In order to avoid this, one should always operate with the same number of forceps, or at least carefully count and record the number before the operation is begun, and before closure of the wound. Unless he is certain of his assistant, he will do well to count them himself. The incision for gynecological exploration or operation is usually in the median line near the pubes.

FIGURE 82.



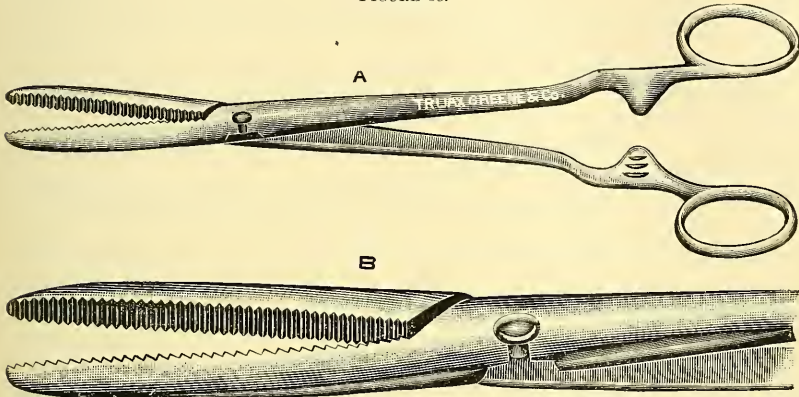
Short hæmostatic forceps. A. Reduced size. B. Section of full size.

Exploration. Every abdominal section should commence as an exploratory incision, and should therefore at first be only long enough to admit the index-finger for examination. If necessary to introduce the hand, the incision may be extended in either direction. The operator now decides whether he will close the wound after the simple diagnostic exploration, or proceed to a complete operation. Mr. Tait,



in urging the exploratory incision as the first step of an abdominal operation, once wisely said: "It is always easy to turn an exploratory incision into an operation, but often quite impossible to turn an incomplete operation into an exploratory incision."

FIGURE 88.



Long hæmostatic forceps. A. Reduced size. B. Section of full size.

The median incision through the linea alba does not expose or wound the recti muscles. If, however, the linea alba has been displaced by a tumor or by other causes and is not readily found, one may properly ignore it, cut directly through the upper facial sheath of the muscle, separate its fibres longitudinally, and then divide the structures beneath until the cavity is reached. Many operators have adopted this method in preference to the usual incision through the linea alba. The purpose is to secure union of the muscular structures themselves, and thereby get a thicker, stronger cicatrix. When cutting down upon a tumor, one often reaches the linea alba with the first stroke of the scalpel, and the subperitoneal fat with the second. The fat is then separated by the finger and handle of the scalpel, and the peritoneal membrane exposed. Bleeding-points are now secured by pressure-forceps; ligatures are seldom required. The peritoneum is then superficially caught by two small pressure-forceps. The operator's left hand retains one, and that of the assistant the other. The peritoneum is usually so translucent that the viscera just beneath can be seen as it glides over them; it is now lifted from the viscera by the pressure-forceps, and by a single stroke of the scalpel divided between them. The grooved director of old is rather a hindrance than a help. In grasping the peritoneum in the two forceps for incision, one should be careful not to include a bit of intestinal wall. The writer once in this way opened the intestine. Immediate suture, however, resulted in prompt union, and no permanent harm was done. Sometimes the intestine is adherent to the parietal peritoneum. The incision must then be made slowly and with great care. One may sometimes avoid cutting through the bladder-wall by recognizing in time its greater vascularity. If the intestines or bladder are adherent and unrecognizable, this fact will be apparent



by the failure of the operator to see the viscera through the translucent peritoneum. Moreover, the peritoneum does not, as in an ordinary case, glide over them. It is then better to prolong the incision upward or downward and enter the abdomen above or below. The adherent viscera may then be detached, and the incision completed to its original point. Deliberation, care, and judgment will usually enable the beginner to find his way safely to the abdominal cavity.

The cavity being open, the incision may be lengthened as desired by the scissors on the inserted index-finger as a guide. The length of the incision will vary with the requirements of the case and the dexterity of the operator; the shorter the incision the less the danger. One, however, should give himself sufficient room for effective work. The added risk of a longer incision by comparison with the added safety of an unimpeded operation is insignificant. The pressure-forceps may now be removed from the bleeding-points; if at any point the bleeding continues, it may be controlled by torsion or by fine catgut ligature.

Before invading the abdominal cavity for purposes of examination or operation, one should seize the margins of the peritoneum by two or three forceps on either side, and draw it out through the wound toward its cutaneous edges so as to make it cover the cut surfaces. The wound is thereby protected and the peritoneum is not stripped off from its adjacent tissues as it might otherwise be during the subsequent manipulations.

**Adhesions.** The conditions which give rise to adhesions usually also cause more or less thickening of the peritoneum. Sometimes the parietal peritoneum is so thick as to be unrecognizable. The operator may be uncertain whether he has cut through the peritoneum. This uncertainty may be very great if there be adherent intestines. Large areas of peritoneum have been detached from the adjacent abdominal wall under the wrong impression that it had already been divided, and that intraperitoneal adhesions were being separated.

Experience in such cases is the guide. There are no safe rules. Adhesions are usually separated by means of the finger, the hand, or the sponge. If great care is not used in separating intestinal adhesions, a portion of the bowel wall may be stripped off with the adherent tissues. This would likely result in sloughing and a consequent fecal fistula. Such an injury, therefore, should be promptly repaired by drawing together the peritoneal margins with fine catgut or silk sutures. The sponge, as used by the late Thomas Keith, is a most useful means of separating the adhesions between intestines or omentum and a tumor. By pressing firmly against the adherent bowel at the point of its attachment to the tumor, one may literally sponge it away from the tumor. It is surprising to note the facility with which rather firm adhesions may thus be broken. In breaking the adhesions in this way one avoids stripping off one or more coats of the bowel. On the contrary, the peritoneal covering of the tumor is apt to remain on the bowel. The sponge method is more gentle, more effective, and less productive of shock than the usual method of tearing with the finger. Adhesions too strong for the sponge or finger have to be cut.

**Hæmostasis.** Hemorrhage during an operation is treated on general surgical principles by forcipressure, ligature, sponge-pressure, or styptics.

As the operation proceeds, forcipressure placed on small bleeding-points, and left there a few minutes, will usually suffice. If the hemorrhage continues, each point may be secured by torsion or by a fine catgut ligature; or several points, by a basting process, may be included in a ligature. Troublesome oozing, deep in the pelvic wall, often subsides on long-continued sponge-pressure. The sponge should be wrung out in very hot water, and very firmly packed against the bleeding surface, and left there for several minutes. Iron, tannin, and alum, since they are apt to leave masses of coagulated blood which may decompose in the pelvis, are objectionable. A sterilized 10 per cent. solution of antipyrine is a safe and often efficient styptic.

Hæmostasis of the vessels of the pedicle is by ligature or suture, and will be described elsewhere in the sections on the special operations.

**Intraperitoneal Ligatures and Sutures.** Silk would be unobjectionable were it always possible to insure complete asepsis of the field of operation during convalescence. Unfortunately, suppuration around the suture or ligature is sometimes inevitable; then, if the patient survive, a sinus forms, leading usually through some point in the external wound to the surface. Suppuration may now continue for weeks, or months, or years, until the suture is dislodged and cast out or manually removed. Catgut sutures and ligatures disappear by absorption in a few days or weeks. If of good quality and properly disinfected they are perfectly reliable and safe. The humiliating experience which the surgeon must occasionally have with silk will be avoided by their use.

**Closure of the Wound.** The ordinary method is by through-and-through interrupted sutures, including the entire thickness of the abdominal wall, and tied upon the skin. The sutures are placed about three-eighths of an inch apart, and include a margin of skin and peritoneum about one-quarter of an inch wide—that is, the needle enters the cutaneous surface a quarter of an inch from the margin of the wound, transfixes all the layers of the abdominal wall, emerges on the peritoneal side also a quarter of an inch from the peritoneal margin, enters the peritoneum on the opposite side at an equal distance from the margin, passes through the wall on that side, and emerges at a point opposite and corresponding to that at which it first entered.

Silk, silver wire, catgut, and silkworm-gut have all been used as sutures. The latter, thoroughly sterilized by boiling, is preferred by most operators. Let the sutures be drawn and tied with only sufficient tension to hold the fragments together. If tied too tightly they strangulate and cut the tissues, and favor suppuration along their course. If the cutaneous margins of the wound gape after the deep sutures are tied, the margins of skin may be brought together by superficial sutures.

Just before and during the introduction of the needle, the assistant should catch up with the pressure-forceps the margin of the rectal sheath, and make traction upon it toward the opposite side of the

wound. The same is repeated as the needle is passed on the other side. The effect of this after the sutures are tied is to bring the margins of the fascia into closer contact. The sutures are usually removed in about two weeks.

When the wound is not more than two inches long and no drain is used, the through-and-through method of closure, if carefully made, is usually adequate. If the incision has been long, and especially if complicated by a drainage-tube or drainage-gauze, ventral hernia is apt to result. To avoid this the margins of the peritoneum and linea alba may be united by a supplementary continuous suture of fine, buried catgut.

*The Buried Catgut Suture Throughout.* Dr. George M. Edebohls,<sup>1</sup> of New York, uses fine catgut sufficiently chromicized to resist absorption for six weeks. His method is as follows: In order to give

FIGURE 84.

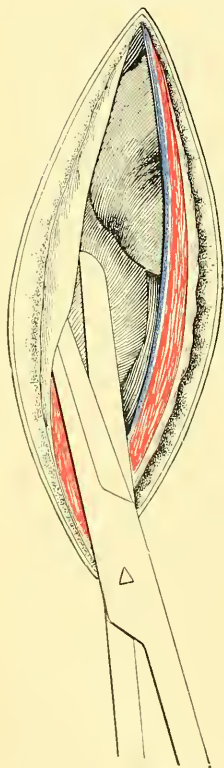


FIGURE 85.

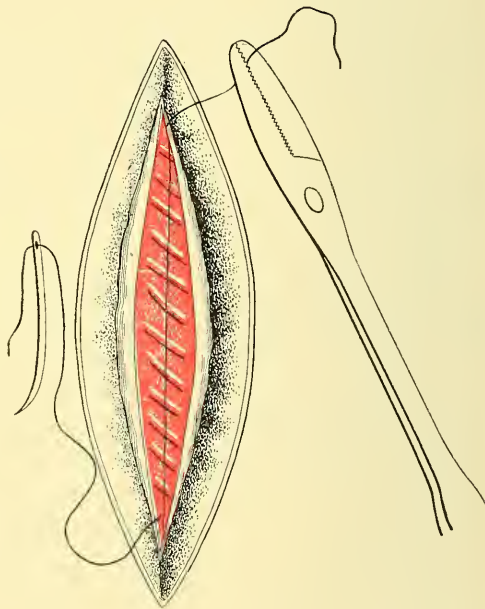


Figure 84.—Fascial sheaths of rectus muscle on one side, being split by scissors.

Blue color represents peritoneum. Red color represents rectus muscle.

Figure 85.—Showing deep tier of buried running catgut suture. The suture embraces peritoneum, posterior edge of the divided fascia, and muscle.

Red color represents recti muscles reunited by second tier of running catgut sutures.

<sup>1</sup> American Gynecological and Obstetrical Journal, May, 1896.



broader surfaces for cicatrization, and consequently greater strength, the incision is made through one of the recti muscles and its sheath. If, perchance, the incision has been directly through the linea alba, without exposing a rectus muscle, he deliberately divides the sheath on either side with the scissors, as shown in Figure 84. This gives double fascial edges and broad muscular surfaces for union. The purpose is to approximate the muscular and fascial layers of the wound so as to secure apposition of homologous parts, and to retain them in approximation long enough to insure firm union.

The running suture is preferable to the interrupted, first, because it brings homologous structures more accurately and more quickly together; second, because the buried knots are decreased in number or entirely avoided. The second advantage is considerable, for the bulky catgut knot tends to suppuration and failure of union.

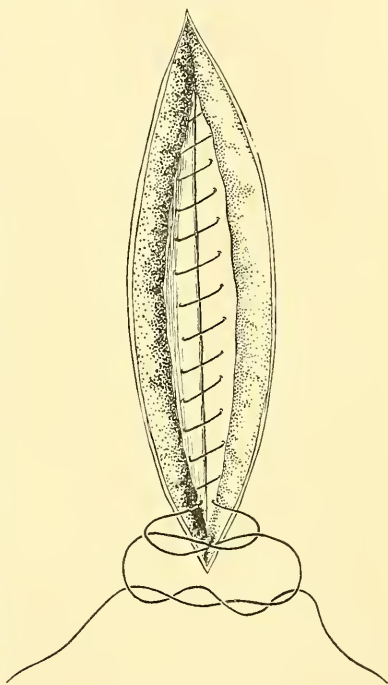
Closure of the abdominal wound by buried catgut sutures, as described by Edebohls, is made as follows:

The needle is introduced at the lower extremity of the wound on the right side, and at the first thrust is carried through fascia and muscle and peritoneum. Figure 85. As it emerges on the opposite side it includes peritoneum and muscle only; the fascia is not included. The suture is then continued as a running suture the length of the wound, and unites the peritoneum, posterior fascia, and muscle. It is then carried back to

the starting-point, whipping together the anterior fascial edges, from which it finally emerges on the right side, and is tied. Figure 86. This is the only buried knot. The subcutaneous fat is not sutured; it falls into place and takes care of itself. The closure is completed by whipping together the margins of the skin, either subcutaneously or by means of the over-and-over stitch, with ordinary fine catgut.

In place of the chromicized catgut, the formaldehyde catgut may be used. The latter resists absorption for five or six weeks. The closure is best made with No. 1 or 0 size gut. The method of Edebohls is most satisfactory, especially for long wounds, when the abdominal wall is thin.

FIGURE 86.



Fascial margins of wound closed by second tier of buried running suture. Sutures of the skin and fat are not represented. The knot is loosely made to illustrate proper manner of tying buried catgut, a single turn in the first half and a double turn in the second half of the knot. The recti muscles are now covered in by fascia.



In operations for ventral hernia, the splitting of the sheath of the recti muscles and the buried suture will be found most effective.

Stitch-abscesses are quite liable to occur unless the following precautions are observed :

1. The abdomen should be opened with a sharp scalpel which will make a clean cut, not a ragged, uneven incision.
2. Great care should be used during the operation not to bruise or tear the wounded surfaces.
3. All bleeding should be arrested before closure of the wound.
4. The necessity for absolute asepsis in hands, instruments, sponges, and sutures is self-evident.
5. The sutures should not be drawn too tightly.

Should suppuration in the wound or along the sutures occur, the sutures, if of the through-and-through variety and tied on the skin, should be at once removed. The buried suture must be left in place until it is absorbed. A dressing wet with a saturated solution of boric acid, two parts, and alcohol, one part, should be continuously applied. Free drainage by incision should, if necessary, be established. Immobilization of the abdominal walls by a firm bandage will tend to prevent separation of the suppurating wound.

**Sponges.** The operator, according to his preference, may use gauze or sea-sponges. See Sterilization of Sponges, in Chapter II. They are used not only in the removal of blood and other fluids, but it may be desirable to pack them in large numbers into the cavity, either to control hemorrhage by pressure or to hold the intestines and other viscera out of the operator's way. In nearly every abdominal section numerous sponges are used for this latter purpose.

*Sponges Lost in the Abdomen.* It is quite impossible during the progress of an abdominal section for the operator to keep track of the exact number of sponges which may be inside of the abdomen; hence numerous humiliating, not to say fatal, results of closure of the wound and completion of the operation with one or more sponges remaining in the peritoneal cavity. The not infrequent occurrence of this deplorable accident, even at the hands of careful men, is the writer's excuse for introducing his two personal experiences; verily, how much experience one may get from a single case!

*The first case* was one of extensive suppuration of the uterine appendages with nearly universal old, firm adhesions throughout the pelvis, and with the uterus enlarged by infectious endometritis and metritis to about four times its natural size. All the diseased organs were removed by abdominal and vaginal section. The operation, especially the hysterectomy, was exceptionally difficult and tedious. The broad ligaments were so short and thick as to be inaccessible for the ligature, and almost for the clamps. Each ligament was so thick that through the vagina it had to be clamped in three parts. The patient was put to bed apparently nearer dead than alive. The writer's usual precautions had been taken to prevent closing the wound with a sponge inside. The sponges had been brought to the operation in sterilized packages each containing eight, so that the number must have been eight or some multiple of eight. Only large, flat gauze sponges were used. The operation

was begun with the eight sponges of one package, which were counted. Two additional packages of eight each were required in the course of the operation, all of which were supposed to have been accurately counted by the nurse in charge of them. Just before the abdominal sutures were introduced the nurse was directed to count the sponges. She reported them "all out." After the introduction of the sutures, and before they were tied, she was told to count them again, and this count also made the number twenty-four and "all out." With the evidence of a double count, that there could be no sponge in the abdomen, the wound was closed.

Three hours later the nurse reported that one of the gauze sponges used in the abdomen could not be found. After consultation with two colleagues it was decided to assume for the time that the missing sponge had been lost outside the abdomen, and that consequently the peritoneal cavity was clear.

Convalescence was uninterrupted until the tenth day, when the stitches were removed. At this time was noticed a semi-resonant mass of irregular ovoid shape, as large as a medium-sized orange, in the region of the right kidney; it gave to the palpating hand the sensation of a mass of gauze mingled with adherent intestines. Two colleagues agreed that it would be wise to wait for developments. Sixteen hours later, at 11 P.M., the mass had increased in size, become painful, the pulse had risen from 100 to 120, and the temperature from 99° to 101°. There were slightly increased distention and a tendency to pronounced nausea. After a hasty consultation, the family being fully informed of our suspicions and fears, chloroform was hastily given and the abdomen opened directly over the mass. The incision was made without the usual assistants, by artificial light, at midnight, and revealed, not a sponge, but a much enlarged kidney surrounded and covered by firmly adherent intestines looped and matted together in an irregular mass. In working through the thickened, unrecognizable, adherent parietal peritoneum, and between the layers of visceral peritoneum and the adherent intestines, also thickened and difficult to recognize, the intestine was accidentally opened. The opening was immediately repaired with interrupted Lembert sutures, and the abdominal wound closed without drain.

Three days later the contents of the small intestine, probably the upper part of the ileum, came through the abdominal wound, and an intestinal fistula was thereby demonstrated. During the following five weeks no feces passed by the anus: all bowel evacuations came through the fistula. The opening was so high in the bowel that nutrition was seriously impaired and emaciation began. The fear of a formidable operation to restore the integrity of the bowel increased day by day. Finally, to the writer's unspeakable relief, in the sixth week fecal matter appeared at the anus. The fistula began to contract, and in a few days was completely closed. The kidney enlargement entirely subsided, and repeated urinalysis showed no evidence of any impairment of its functions.

The prolonged anxiety and distress of such a case are beyond description. They are, both for the surgeon and for the patient, a life-short-

ening experience. The burden of this case was lightened, first, by the ultimate recovery of the patient; second, by the complete relief which she has since experienced from a distressing intestinal catarrh which had made her a semi-invalid for fifteen years. This relief is attributed to the continuous rest to which that portion of the bowel below the injury was subject while the fistula was open.

*The second case* was one of intra-ligamentous ovarian cyst on each side, with double sactosalpinx, serosa, and universal adhesions. The sponges were carefully counted before the incision was made. Before the wound was closed the nurse counted them again and reported one missing. After a search of fifteen minutes among the abdominal viscera, the nurse in the mean time looking for the sponge outside, it could not be found. In the hope of still finding the sponge, the incision, previously short, was then extended to the navel, preparatory to turning out the intestines, when the nurse found the sponge outside; it had been carelessly misplaced in a jar and overlooked. The patient fortunately recovered.

These two cases illustrate the degree to which a surgeon, with all the responsibility, may be powerless to protect his patient against the inefficiency or carelessness of an assistant whose shortcomings, perchance, he may be unable to discover until it is too late.

The precautions which may be taken in order, so far as possible, to guard against accidentally leaving a sponge in the abdominal cavity are as follows:

1. All sponges should be so large as not easily to be overlooked by the operator. If sea-sponges are used, let them all be the largest flat sponges, and of as nearly uniform size as possible. Gauze sponges are, however, preferable. They should be made of good absorbent gauze in four thicknesses, and should be of uniform size, at least six inches wide by twelve to sixteen inches long. All sponging can be done with large as well as with small sponges. Let the small ones, then, be discarded. They serve no useful purpose.

2. All sponges designed for abdominal section should be kept in packages of eight each. This number will suffice for the ordinary operation. If more are needed, additional packages may be opened. As soon as a package is opened, the sponges should be accurately re-counted and recorded. This precaution will invariably fix the number for any operation at eight or a multiple of eight.

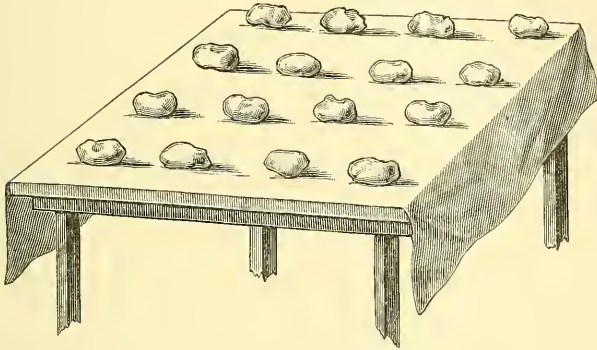
3. Toward the close of the operation the sponges should be again counted. Experience has shown that under the demoralizing influence of hurry and excitement which often goes with the close of a desperate operation, the nurse in charge of the sponges is liable to blunder in the count. It is well, therefore, that the count be repeated two or three times, and, if possible, by different individuals.

The operator, whose energy is consumed in the effort to shorten the time of the operation, when, perhaps, any moment lost is full of danger, cannot stop for sponge counting; yet only a surgeon can appreciate the satisfaction which he feels in knowing absolutely that every sponge is out. The writer, therefore, now uses a simple device by which the



number of sponges may at a glance be apparent to any one. It is this : At the time of closing the wound the sponges are arranged on a table covered with a sterilized towel in rows of four each. The subject is so urgent that, even at the risk of seeming triviality, the accompanying cut is introduced.

FIGURE 87.



Sponges arranged in rows of four each.

**Dressings and Bandages.** The ordinary combination aseptic dressing of gauze and wood-wool or cotton, secured by strips of adhesive plaster and a firm abdominal bandage, will suffice. The nurse should be cautioned to use care lest the dressing and bandage slip up and expose the lower end of the wound. If a vulva dressing is also used, it should be kept separate from the abdominal dressing, for otherwise fluids may pass by capillary attraction from one to the other; this may explain the fact that stitch-abscesses usually begin at the lower end of the wound. It is well to use two abdominal bandages, one to reach from the hips to the umbilicus, or, if necessary, higher, and the other to lap over the lower part of this and reach to the middle of the thighs. The lower bandage keeps the dressing from slipping upward. It may be loosened for movement of the bowels or urination.

## 2. Vaginal Section.

The vaginal route for opening into the peritoneal cavity is often preferred. The incision may be made either anterior or posterior to the uterus—*i. e.*, between the uterus and rectum or between the uterus and bladder. The technique of the procedure varies within wide limits, and will therefore be described in the discussion of special operations. See Vaginal Section in the chapter on the Treatment of Pelvic Inflammation.

## Sacral Resection.

Hysterectomy and other intra-pelvic operations have been done through an opening made by resection of the sacrum after the method



of Kraske. The value of the method has not been established. The reader is referred for further information to the literature of the subject by Kraske and others.<sup>1</sup>

## CHAPTER VII.

### DRAINAGE IN MAJOR OPERATIONS.<sup>2</sup>

Two classes of cases present themselves: first, cases which, up to the time of operation, are free from infection. Solid and cystic tumors and tubal pregnancy, which have not become infected, belong to this class; second, cases in which infection has occurred previous to the operation. This class includes pelvic inflammation in its various forms and stages, such as inflammation of the Fallopian tube and ovary, including pelvic abscess, pyosalpinx, and infected tumors.

**Drainage in Non-infectious Cases.** In this class of cases, decided to be non-infectious, that is, not primarily infected, the sole indication for drainage is the removal of blood, serum, or other non-infectious fluids such as might otherwise accumulate in the peritoneum, and, if left there, become infectious. Both experiment and experience have clearly shown that the non-infectious blood and serum which may accumulate in the peritoneum after a clean, adequate operation have little or no power for harm. Serum and liquid blood are rapidly absorbed. Coagulated blood may be absorbed, or it may become encapsulated and gradually removed by the action of leucocytes, or may become organized and remain harmless for an indefinite period. Both blood and serum are excellent culture media for microbes; hence the necessity to keep them non-infectious by aseptic surgery. The peritoneum has great power to resist infection. It is known to take up and dispose of large quantities of infectious material, even without drainage. Recent studies and experience prove that the drain is often more potent as a medium for the introduction of sepsis than for its removal. Drainage, therefore, after a clean operation in a case not hitherto infected, is contraindicated.

**Drainage in Infectious Cases.** The above designation, "infectious cases," means cases of infectious antecedents. Bacteriological examinations of reproductive organs removed for chronic inflammatory disease show that the pus is usually sterile, or if organisms are present, they are seldom active<sup>3</sup> at the time. "In forty-four specimens of ovaries and tubes, organisms resembling gonococci were found in six cover-glass preparations, but did not grow in cultures. The staphylococcus

<sup>1</sup> A description of the Kraske method may be found in a paper by E. E. Montgomery, Transactions of the American Association of Obstetricians and Gynecologists, 1891.

<sup>2</sup> One of the most valuable contributions yet made to the subject of peritoneal drainage is from the pen of Dr. J. G. Clark, Resident Gynecologist in Johns Hopkins Hospital. The author has made numerous adaptations from this paper. See American Journal of Obstetrics, May, 1897.

<sup>3</sup> Clark. American Journal of Obstetrics, June, 1897.

albus and aureus and streptococcus were found once in culture. With these exceptions, the forty-four cases were negative. Fifty-six uteri were examined, in none of which were organisms found in culture. The gonococcus was observed once in cover-glass preparations.

“These results in general coincide with the reports of Menge, Schauta, Reymond, and Magill.<sup>1</sup> In the examination of one hundred and forty-four cases by Schauta, streptococci and staphylococci were found four times. Menge has observed the staphylococcus once in twenty-six cases, and Morax once in thirty-three cases. Cases of pneumococcus infection have been reported by Zweifel, Fromme, and Wertheim. A fatal pneumococcus peritonitis followed the infection in certain cases of Frommel and Witte. Reymond and Magill believe that a salpingitis may be produced by the colon bacillus, and think that it gains entrance through adhesions or through close propinquity to the intestine. From this general review of the bacteriological conditions in these cases, we conclude that infection of the peritoneum from the diseased area at the time of operation is not likely to occur, as the initial infecting organism has largely disappeared.”

Formerly the escape of the smallest quantity of pus into the peritoneum during an operation was considered an imperative indication for drainage. Now, it follows from the foregoing paragraphs that even large quantities may escape and, being perfectly free from virulent or active microbes, not call for drainage.

Comparison of a large number of drainage pus-cases with an equal number of like cases not drained has been reported, and uniformly shows a strong preponderance of recoveries in the non-drainage series. This preponderance is convincing proof that the drainage was at least useless. The larger mortality in the drained cases is attributable to infection introduced through the drain.

**Possible Evil Results of Drainage.** In addition to the increased danger already mentioned from the direct introduction of infection through the medium of the drain, the following evil results are not infrequent:

1. Obstruction of the bowel.
2. Fecal fistula.
3. Vesical complications.
4. Hernia.

1. *Obstruction* may occur from adhesions set up by the irritating presence of the drain. An adherent intestine sharply kinked may suddenly become impermeable, or gradually contracting bands may slowly shut off its lumen. Most frequently the obstruction is partial, and gives rise to constipation and griping pains for days or weeks after the operation. In such cases, when fatal, the autopsy has usually shown the intestines matted together around the drainage cavity in an unrecognizable mass.

2. *Fecal Fistula* is the occasional result of necrosis from direct pressure of the drain. The irritating presence of a gauze drain may cause an inflammation so destructive as to produce necrosis and conse-

<sup>1</sup> Annals of Surgery, 1896.

quent fistula. If the bowel is opened during an operation and has been well repaired, the drain is unfavorable to union and is contraindicated. If, however, the intestinal opening is deep in the pelvis, or otherwise so inaccessible as to prevent thorough suturing, if, in a word, union is improbable, the drain is indicated as a means of exit for fecal matter.

3. *Vesical Complications.* The territory to be drained is usually in close relations with the bladder. Inflammation around the drain, therefore, may give rise to adhesions between the bladder and adjacent organs, or may extend to the bladder; in either case, vesical disturbance more or less severe may arise.

4. *Hernia* in drained cases is much more common than is usually supposed. This is because the drain separates the fascial sheaths of the recti muscles and other surfaces which otherwise would immediately unite; the small breach in the wall thus made increases, and more or less hernia is the result. See Vaginal Drainage in a later paragraph of this chapter.

To Prevent Infection, and thereby to avoid the necessity for drainage, is an essential purpose of every abdominal section. The subject may be summed up in the proposition to do the operation in such a way as not to require drainage. This involves the following precautions:

1. Thorough asepsis of hands, instruments, and other appliances. See Chapter II., on Antiseptics and Asepsis.

2. Wherever the peritoneum is injured or sacrificed, let the injured part, if possible, be covered by adjacent peritoneum. This may require numerous sutures and careful plastic work.

3. Control hemorrhage, if practicable, even to small oozing points. This, for want of time or for other reasons, may be impracticable. It may then be safer to leave small accumulations to be taken up by the peritoneum rather than by a drain.

4. Avoid all unnecessary injury to the tissues. All traumatisms favor sepsis. Do the operation adequately, but with the least possible amount of operating.

If, unfortunately, an accumulation of pus ruptures into the peritoneal cavity, it should be removed as soon as possible by careful sponging. If the pus is sterile, the sponging is sufficient. If there is reason to fear that it is septic, the peritoneal cavity should be freely irrigated with a normal salt solution, six-tenths of 1 per cent. Clark<sup>1</sup> advocates thorough peritoneal irrigation whenever any pus comes in contact with the peritoneum. He says: "For the last three years it has been our custom not only to irrigate the abdominal cavity thoroughly after all operations where pus or other fluids have escaped, but frequently also to leave as much as one litre of salt solution in the peritoneal cavity before closing the abdominal wound." The writer cannot too strongly urge the retention of considerable salt solution in the abdomen after irrigation. It is rapidly absorbed, and thereby not only carries out septic matter but increases the arterial pressure.

"It is a well-known principle in physics that a substance will undergo combustion or solution much more rapidly in a finely-divided

<sup>1</sup> American Journal of Obstetrics, May, 1897.



state than when it is massed together. The same principle may be applied to the disposal of foreign matter in the peritoneal cavity. In Muscatello's experiments the leucocytes could easily surround the smaller foreign bodies and carry them into the general circulation through the spaces in the diaphragm; but where they were larger, many leucocytes were required for this task, and the removal of still larger particles could only be accomplished after their encapsulation and subsequent slow disintegration by the leucocytes. His experiments also demonstrated that there existed an intra-peritoneal current capable of transporting the carmine bodies, even against the force of gravity, from the pelvis to the diaphragm. When to these conditions we add the proved fact that the normal peritoneum can take care of a large amount of infectious matter without danger to the animal, it appears that there can be no question but that it is better to disintegrate and distribute infectious matter rather than allow it to remain in a localized area."<sup>1</sup>

**Postural Drainage.** This method, advocated by Clark, consists immediately after the operation in elevating the foot of the bed eighteen inches, and maintaining that elevation for a period of twenty-four to thirty-six hours. The object is both to prevent fluids from accumulating in pockets or limited spaces, and to distribute them by gravity throughout the peritoneum, where from contact with broader surfaces they are more readily taken up. The method also includes free irrigation of the peritoneum at the time of the operation with a six-tenths of 1 per cent. normal salt solution, and the retention of a pint or more of the fluid in the abdomen. This is to wash out as much as possible of the septic fluid, and to dilute the remainder so as to deprive it of its virulence.

"This postural method of drainage is offered as a prophylactic measure against post-operative peritonitis, but *not as a curative measure after the peritonitis is established.* It should, therefore, not be employed when an operation is performed for the relief of purulent peritonitis, or for inflammatory conditions associated with general peritonitis, as, for instance, some cases of appendicitis."

The general indications and contraindications for drainage will appear from the foregoing paragraphs to be as follows: In a clean operation, one in which not only the pus but also the sac containing it is removed, and in which therefore no diseased surfaces are left open to secrete septic matter and keep up the supply, drainage is contra-indicated. The non-septic fluids and, to a limited extent, the septic fluids, will be taken up and disposed of by the peritoneum more safely than by the drain. On the other hand, when pus-producing surfaces are left without drainage, they may continue to be a persistent source of infection, and the supply of septic matter may be greater than the peritoneum can take up; then one of two results must follow: Either adhesive peritonitis is set up around the diseased parts, and the infected territory is walled off by plastic effusion, or the micro-organisms and their poisonous products are spread throughout the peritoneum, and

<sup>1</sup> Clark.



thence poured in fatal quantities into the general circulation. Under these conditions drainage is indicated at the time of operation. If after operation septic fluid becomes walled off, no time should be lost in opening and draining the abscess. The septic indications for drainage are:<sup>1</sup>

1. General septic peritonitis.

2. The presence of a nidus of infection whence septic matter must continue to be propagated. This may be an open intestine, an abscess, a cyst, an infected hæmatocele, or a large amount of necrotic tissue which cannot be safely removed. The indication may be clear when old and extensive adhesions are present, when an abscess or an infected hæmatocele occurs in the pelvic cellular tissue, or when a cyst is so firmly adherent and necrotic that it cannot with safety be entirely removed. In these conditions the drain gives an outlet for the septic fluid and the broken-down necrosed tissue.

3. Hemorrhage which cannot be controlled by suture, ligature, temporary pressure, or hot sponges.

#### Different Forms of Drainage.

Tubular Drainage is usually through soft rubber or small glass tubes. For drainage through the vagina rubber is preferable to glass.

FIGURE 88.



Vaginal gauze drain extending from Douglas's pouch to the vulva for capillary drainage.

The tube is especially useful as a medium for drainage and for washing out septic cavities, such as abscesses which have been walled off

<sup>1</sup> Adaptation from Watkins. American Gynecological and Obstetrical Journal, March, 1896.

from the general peritoneum. The presence, however, of a tube in the peritoneal cavity usually causes, in a few hours, the surrounding organs to be fused together. The space which the tube occupied is then isolated from the remainder of the peritoneum, and is the only space which it can possibly drain. For this reason tubular drainage in the abdomen has been largely discarded.

**Capillary Drainage** by means of a continuous strip of gauze has been extensively used for peritoneal drainage, both through the vaginal and abdominal wound. It is applicable to the second and third indications for drainage, as stated in the foregoing paragraphs.

There are two principal indications for the use of gauze packing: 1. Hemorrhage which cannot be practically controlled in any other way without unduly prolonging the operation. The gauze packing then used is immediately a compress, but if left longer than is necessary for this purpose, becomes a capillary drain. 2. Pelvic gauze packing is indicated when it is desirable to quarantine the field of operation from the rest of the abdominal cavity. The rapidity with which adhesions form around the packing is well known. In a few hours the septic area is shut off from the general peritoneum by the adhesions, and in this way the septic influence is centralized and mostly confined within narrow limits.

The above use of the gauze should not be confounded with its use as a drain. The value of gauze for drainage as usually understood, that is, for the removal of any fluid which may form in the peritoneal cavity, is probably overestimated. The peritoneum has often demonstrated its ability to take care of large quantities of secretion. If, as many claim, it be true that the presence of a drain excites the secretion of large quantities of fluid which would not otherwise be secreted at all, it follows that the drain is often not so necessary as the large quantities of fluid which it carries off seem to indicate. Clearly it would be absurd to use a drain for the purpose of carrying off secretions which it had itself produced. Moreover, the gauze packing often acts as an obstruction to the removal of fluids, and may therefore, if required as a drain, have to be used in conjunction with tubular drainage.

**Abdominal Drainage**, if employed, may be either by the tubular or by the capillary method. The route from the pelvis to the abdominal wound is long and in close relations with the bladder, intestines, and omentum, which should have no necessary relation with the field of operation, but which, from contact with the drain, are unfortunately liable to infection, adhesions, perforation, and hernia. Moreover, the long sinus left after the removal of the drain is often slow to heal, and its outer end is prone to contract rapidly and leave in the pelvis a troublesome, undrained or imperfectly drained pocket. For these reasons the abdominal route is objectionable.

Should it be necessary to drain through the abdomen, a small glass tube or gauze may be used. The former should be long enough to reach to the bottom of the pelvis, and is kept from slipping into the abdomen by a flange at the outer end. This form and route of drainage are useful in operations for peritonitis and for the removal of serous effusions. The wound is dressed by packing gauze over it and around

the protruding portion of the tube. A perforated, thin sheet of rubber dam is snapped over the flange, and a mass of absorbent cotton is placed over the end of the tube and enveloped in the rubber dam. The cotton absorbs all the drainage fluid. It should be renewed often enough to keep it dry. The rubber dam confines the drainage fluid to the cotton, and thereby protects the dressings proper from moisture. The proper time for the removal of a drain is when it ceases to drain, or when little fluid comes through it. In draining for non-suppurative cases the first fluid is usually a dark bloody serum. When this diminishes in quantity and becomes light colored or colorless, the drain should be removed. A glass drain should be turned around twice daily. This is to prevent parts of the omentum from working their way into the small holes at the inner end of the tube. Such an accident may give great trouble in the final removal of the tube. On this account it is better to use tubes with only the large openings at the two ends, without the small perforations shown in Figure 89.

FIGURE 89.



Keith's small glass drainage-tube.

**Vaginal Drainage.** The route from the pelvic cavity to the vagina is short and direct; hence the vaginal drain is generally preferable. If in the operation an opening between the pelvic cavity and the vagina has not been made, and drainage is necessary, it is often better to make the opening for that purpose. The great advantages of the vaginal route are: 1. Minimum risk of hernia; 2, natural and dependent drainage, as shown by experience; 3, more satisfactory convalescence. The safety of this route depends largely upon the previous thorough disinfection of the vagina.

The introduction of a gauze drain, whether abdominal or vaginal, is as follows: The end of a continuous strip of double gauze, with the edges turned in and stitched together to prevent fraying, is doubled backward and forward upon itself, like the folds of a fan, from the part to be drained to the surface. Over this an external dressing is placed and changed as often as it becomes saturated. Figure 88 shows a vaginal drain in place.

The time for removal of a gauze packing varies with its purpose. If used to control hemorrhage, it may be removed in twenty-four hours; if the indication is drainage, it may be left for five days unless, as occasionally happens, it acts as an impediment to drainage. The writer has repeatedly observed patients to show signs of septic absorption on the second or third day, when the removal of the gauze was followed by a gush of pent-up fluid and prompt relief of all urgent symptoms. It is not usually necessary, after the removal of the original drain, to introduce fresh gauze. If at any time the opening tends to contract too rapidly, or drainage becomes imperfect, the gauze may be renewed or a tube may be inserted.



*The classical dictum was, "When in doubt, drain." If, however, the irritating influence of the drain is to cause the secretion of fluid, which otherwise should not be secreted; if the peritoneum, left to itself, is capable of taking up and disposing of large quantities of fluid, even, to some extent, of septic fluid; if the drain is more prone to introduce than to carry out sepsis, the dictum may have to be reversed. When in doubt, don't drain.*

## CHAPTER VIII.

### AFTER-TREATMENT IN MAJOR OPERATIONS.

#### After-Treatment in Simple Cases.

THE great majority of abdominal sections, if properly performed, are followed by normal convalescence, and therefore require little active treatment.

Rest, bodily and mental, is the first consideration. The patient is placed in a bed previously warmed by means of hot-water bottles or bags. If there is a tendency to shock, the warm applications should be left around her. The careless use of hot-water bottles or rubber bags before recovery from the anæsthesia has occasionally resulted in serious burns. In one case the writer observed an enormous blister on the outer surface of each thigh; in another, on the sole of the foot. Both patients sustained deep sloughing of the cutaneous and subcutaneous structures, which finally required extensive skin-grafting. As the freezing of water in a pipe more readily takes place when there is no circulation, so in conditions of shock, when the circulation is feeble, burns are more liable to occur.

The patient is usually kept on the back for two or three days. She is apt to attribute the inevitable pain and discomfort from the anæsthesia and operation to this position. It may then be wise, if she insists, to turn her on the side. If she does not have the expected relief she will then more readily resume the dorsal position and more patiently wait for the natural subsidence of pain and discomfort which, if all goes well, a little time is sure to bring.

Rest for the Stomach is desirable. A variable degree of irritability of the whole digestive tract is the common result of anæsthesia, especially in cases of abdominal section. The vomiting and nausea of this state are rather increased than diminished by drugs, food, and drink. The only treatment is to withhold them until the toxæmia of the anæsthesia has passed off. In some cases the exception may be made of giving slowly a teacupful of hot water. This may be promptly thrown up, but it will wash out the stomach and, perchance, give a little relief. The knees may be drawn up into the most comfortable position and



supported on a pillow or roll. The judgment and discretion of a wise nurse will furnish a guide more useful than the most elaborate rules. The best nurse will move, when possible, along lines of least resistance, or, when necessary, will use a gentle firmness that inspires confidence. She will carry her patient past the critical period with the minimum friction and discomfort. The exclusion of the relatives and friends from the bedside is usually imperative, and will not be difficult if properly managed. They have, perhaps, travelled long distances, and seriously believe that the comfort and consolation which they alone can give are highly essential to the patient's recovery. They must be told in kindly but positive words that the results of experience in thousands of cases demonstrate the necessity of absolute quiet; that the presence of the husband, the mother, and other near relatives excites emotions; that emotion consumes energy, and that the patient has no energy to spare. Such a statement is usually sufficient; if not, the surgeon must enforce whatever regulations the welfare of the patient may demand. If she becomes restless and anxious because the relatives are kept out, it may be well to admit them. Most patients, however, during the first two or three days do not ask for them, and many prefer not to see them. Frequent sponging of the surface, care to keep the bedclothing under the patient smooth, and such other minor attentions as only a good nurse can suggest, all contribute to the desired end—rest.

**The Bowels.** If the temperature, pulse, and respirations are normal, or nearly so, and there is no abdominal distention or other unfavorable sign, movement of the bowels may be deferred until the second day; then they should be moved by enema or mild cathartic. Some surgeons commence immediately after the operation with half-grain doses of calomel given every half hour until eight or ten doses have been given or the bowels act. If there is no action the calomel is immediately followed by a saline purge or an enema, or both.

Early catharsis is a good precaution against sepsis and peritonitis, and may be used in all cases in which these complications are especially feared. In perfectly normal cases it is unnecessary. Early movement of the bowels, however, is desirable in all cases. After the initial movement they should be kept regular by cathartics or enemas, or both.

Pain of variable degree is usually present during the first day or two. Opium and its preparations lock up the secretions, induce nausea, arrest peristalsis, cause distention, and mask any symptoms which otherwise might give warning of approaching danger; they, moreover, counteract the influence of cathartics, and would therefore prove a serious obstacle if it became necessary to move the bowels. Such drugs, if given at all, should be given with great circumspection. Phosphate of codeia creates less nausea, constipation, and other disturbances than opium or morphine. Its hypodermic use in half-grain doses is sometimes permissible during the first twenty-four hours to allay nervous irritation and pain and to insure needed rest. There are conditions of great nervous irritation in which morphine in full doses is strongly indicated. See *Hysterical Vomiting*, page 131.

**Thirst.** "Oh for a good drink!" is one of the first calls. The common practice of withholding water as a routine is not approved. In the absence of nausea it may be given cold or hot in moderate, even in satisfying, quantities. The amount may be left to the discretion of an intelligent nurse. Charged waters, ginger ale, champagne, and other such drinks, while permissible, are not usually required, and may do harm.

**Food.** Except in cases of exhaustion, food is withheld for one or two days. It is usual to commence feeding after the bowels act or flatus passes. Eructations of gas from the stomach are an indication for withholding food. The downward passage of flatus is a good prognostic sign. "*Qui crepitat vital.*" The diet for the first few days is preferably milk, with or without lime-water, beginning in small doses and, according to the tolerance of the stomach, gradually increased. A teaspoonful at a time may be given at first, and repeated in thirty minutes. If this is tolerated the doses may after a few hours be doubled, and so on until several ounces at a time are given. Finally, after two or three days, if all goes well, the amount may be largely increased until full quantities are taken.

**Getting Up.** The patient may sit up about the end of the third week; if the incision was long, and the union is not quite firm, she should be kept in bed longer.

After the removal of the sutures—see page 96—the wound is dressed as before, except with progressively lighter dressings, for a period of two weeks. The new cicatrix should be supported first by straps of adhesive plaster, and later, when the patient begins to walk, by a properly-adjusted bandage. A variety of suitable bandages may be found at the instrument or drygoods shops. The bandage should be worn continuously in daytime for six months. A lighter flannel bandage may be used at night.

#### After-treatment in Complicated Cases.

**Shock** associated with abdominal section is the same as after other operations and injuries. If it occurs during the operation, use at once the extreme Trendelenburg position, and flood the peritoneal cavity with a quart or more of normal salt solution, six-tenths of 1 per cent., at a temperature of 105° F., and complete the operation as soon as possible. After the operation elevate the foot of the bed. Among other measures for the treatment of shock are the application of dry heat to the surface, the hypodermic administration of strychnine sulphate every four hours in doses of one-thirtieth of a grain each, the free hypodermic use of whiskey, at least four drachms every hour, the hypodermic injection of two grains of camphor dissolved in ten minims of sterilized olive oil, to be given every hour, and copious high rectal enemata of warm normal salt solution, to be retained if possible. Shock is most apt to occur when considerable blood has been lost during the operation; whether from this cause or not, the urgent indication is to fill the bloodvessels, and thereby increase arterial pressure. The most effective means to this end is hypodermoclysis;

that is, the infusion through an aspirator needle of large quantities of normal salt solution directly into the tissues. It is usual to introduce deeply under each breast at least eight ounces, and to repeat in the outer thigh or abdominal wall if indicated. See Hypodermoclysis below.

**Secondary Hemorrhage.** It is often difficult to differentiate hemorrhage from shock. The former, if post-operative, is usually slow and may not declare itself until several hours after the operation. The latter more commonly begins some time during the operation.

*Diagnosis.* The symptoms of hemorrhage are well known. The patient has, perhaps, rallied well from the operation with good pulse and temperature. Presently, or some hours later, there are symptoms of approaching collapse—*i. e.*, rapid, thready pulse, subnormal temperature, pallor, sighing, gaping, and cold surface. If these symptoms appear, the presence of much clotted blood in the drainage-tube may clear the diagnosis. The gauze drain would show a stain of deeper red than ordinary bloody serum would make. Both of these signs, however, may fail.

If there is no drain one may often work a small glass female catheter through the wound between the stitches. Hemorrhage would then declare itself by the presence of clear blood in the catheter. In cases where hemorrhage was feared the writer has occasionally tied the sutures in bow-knots. This facilitates the opening of a part of the wound for diagnostic purposes and obviates the necessity of reintroducing the sutures.

*Treatment.* To reopen the wound, find the source of hemorrhage, apply a ligature or a pressure-forceps, sponge or wash out the cavity, and close the wound with the patient bordering on collapse is, indeed, a serious undertaking. If, however, there is hemorrhage, any other attempt to check the bleeding is not only useless, but a dangerous waste of time.

*Hypodermoclysis.* The most effective means next to the ligature of combating the results of hemorrhage is the hypodermic injection of large quantities of normal salt solution. The strength, according to Bacon, should be, not, as generally directed, six-tenths of 1 per cent., but about eight-tenths—*i. e.*, eight parts in one thousand. An even teaspoonful of table salt in a pint of water is a safe and reliable approximation to the required strength.

The technique of this simple and most valuable procedure is as follows: The saline solution and the apparatus for its injection are sterilized by boiling.

The solution, having been boiled, is now cooled to the proper temperature, say 110° F. The surface through which the needles are to be introduced is sterilized, and the needles, as shown in the diagram, are thrust deeply into the cellular tissue under the skin. The solution flows from the bottle or funnel by its own weight. An elevation of four or five feet is necessary to make the fluid flow freely. Constant gentle massage over the injected area will promote the distribution and absorption of the fluid. Ten or fifteen minutes will usually suffice for the introduction of a pint of solution. If the apparatus



shown below is not available, a glass funnel attached to a large hypodermic needle by means of a long rubber tube is an adequate substitute. The fluid passes rapidly into the circulation and immediately increases the arterial pressure, and the procedure gives rise to little or no pain. It is sometimes necessary, after an exhausting hemorrhage, to inject at intervals as much as three or four quarts in a single day.

FIGURE 90.



Apparatus for hypodermoclysis. The funnel contains twenty ounces. A rubber tube, with shut-off attached, connects it with a Y-shaped glass tube. Two small rubber tubes connect this with large aspirator needles or large hypodermic points. The injection may be made into the thighs, abdominal wall, or under the breasts. The submammary region is usually selected.<sup>1</sup>

The prime indication to increase arterial pressure is ordinarily more safely and quite as effectively fulfilled by this method as by the direct injection of blood or salt solution into the vessels. When the loss of blood has amounted to between one-fourth and one-half of the entire quantity, some prefer to throw the solution directly into a vein. This demands the greatest care in asepsis and extreme precaution against the introduction of air. High rectal enemata of salt solution are useful, but less effective than hypodermoclysis.

The hemorrhage having ceased, the subsequent treatment is that of shock. If food by the stomach is not tolerated, rectal alimentation should be used every four hours. A good combination for this pur-

<sup>1</sup> Dr. C. S. Bacon. *International Clinics*, vol. i., Second Series.



pose consists of the white of an egg, three ounces of peptonized milk, and one ounce of whiskey.

**Sepsis.** The phenomena of sepsis are often considered under the name peritonitis. There are two varieties: first, plastic or adhesive; second, exudative. In the plastic variety adhesions may form around the diseased area. In this way the infection may be shut off from the general peritoneum and confined within narrow limits. In the exudative variety the plastic or defensive action is absent or inadequate, and the infection therefore spreads throughout the peritoneum and sets up a rapid and fatal blood-poisoning. It is a mistake to attribute the evils of sepsis to the associated peritonitis. The inflammatory process is an effort of nature to protect the general system against infection; if plastic and adhesive, it may succeed; if exudative, it usually fails. It is the infection that specially endangers life, not the associated peritonitis, which may or may not save it. Sepsis, then, or, to use a better term, infection, may be clinically classified as follows:

1. Localized infection.
2. General infection.

1. *Localized Infection.* This usually finds its expression in the form of an abscess at the seat of the operation. It may be around an infected pedicle, suture, or ligature. The nidus may be a surface laid bare in the operation and not covered by peritoneum, or it may be pathological tissue which could not be, or at least was not, removed.

The symptoms are those of septic absorption: they are rapid but usually strong pulse, variable elevation in temperature, localized pain, sweats, chilly sensations, with little or no tendency to collapse. Examinations will usually show a progressively enlarged swelling in the pelvis. This is usually felt by conjoined examination. Stitch-abscess may give rise to the same symptoms, but usually in less degree.

Treatment is simple and satisfactory. Under anæsthesia the abscess should be promptly opened and drained. The drainage channel is usually through the incision by which the peritoneum was entered in the original operation—*i. e.*, through the abdomen or vagina. If a drainage-tube is already in the wound, there may be spontaneous rupture of the abscess into the tube. In an aggravated case it is sometimes best to make through-and-through drainage from the abdominal wound to the vagina. Rubber tubes, not gauze, are best for drainage.

2. *General Infection of the Peritoneum*—*i. e.*, exudative peritonitis, so-called—is fatal. Every abdominal surgeon is painfully familiar with the characteristic symptoms. He has descried them from afar as one may discern the black cloud near the horizon. In the balance between hope and fear he has watched the anxious face, the drawn expression, the progressively rising temperature, the nausea, at first attributed to the anæsthesia, then as this subsides the vomiting of sepsis which takes its place, the frequent regurgitation of bile mixed with blood and mucus and growing darker and darker. He has recognized the gradual failure of the pulse, first weak, then running, then thready to the vanishing point, the parietic and distending bowels, which refuse to act, the rapid

respirations, the cold extremities, the staring eyes, the wide nostrils, and, finally, the inevitable collapse.

Treatment is utterly useless. The symptom-group just outlined may, however, be present in less grave conditions, among them the local, circumscribed infection above described. Bowel distention, vomiting, fever, and rapid, weak pulse may be also due to causes other than general peritoneal infection. In view of this possibility, therefore, active treatment may be indicated.

The first effort should be directed to the movement of the bowels. Try calomel, one-half grain, every half-hour until the bowels have acted. Let this be followed, if necessary, by the solution of citrate of magnesia, a wineglassful every fifteen minutes, or more if the stomach will tolerate it. Copious rectal enemata may stimulate the bowels to act, or at least to expel the flatus. The enema may be of stiff castile soapsuds, with a drachm of turpentine thoroughly mixed in each pint. It may be a mixture of glycerin, Epsom salts, and water, each two ounces, or a quart of olive oil or linseed oil. A large enema should be given slowly through a long rectal tube introduced as high as possible, with the patient on the left side. The muscular walls of the bowel in this condition are generally paretic; hence the great difficulty in stimulating them to contract and by peristalsis to expel their contents.

Whiskey, strychnine, camphor, ammonia, rectal alimentation, and other supporting measures may be used as described for the treatment of shock. Under such management patients with symptoms like those of general peritoneal infection may recover.

Serum therapy, or the antitoxin treatment of sepsis, is on trial, and with results thus far not unpromising. There is some hope that developments along this line may result in the discovery of successful specific treatment of general sepsis. The time for a more positive statement on this subject has not come.

**Hysterical Vomiting.** In about 1 per cent. of abdominal sections the operation is followed by vomiting, frequent, violent, prolonged, and exhausting. The nervous depression is profound; the pulse may rise to 170 or 180 to the minute. The condition may continue for several days, with final recovery, or may pass into collapse. The pathology of this phenomenal nerve-storm, with the stomach for the storm-centre, is unexplained. It may be due to toxæmia, or to local irritation similar to that which produces the vomiting of pregnancy. The causes are widely different from those of the sepsis above described. There is little or no fever; the temperature may be subnormal, as in shock; the bowels are seldom distended. There is simply colossal, almost incessant, vomiting. Starvation and the violent exertion of the vomiting soon exhaust the patient. The relation of the stomach disturbance to the associated nerve depression may be causative, concurrent, or resultant.

*Treatment.* The vomiting sometimes suddenly ceases without apparent cause. The removal of the sutures or of a drainage-tube has been followed by prompt relief. In one case the vomiting suddenly ceased upon simply reopening the lower end of the abdominal wound, and, nothing abnormal being found, closing it again.

The diagnosis once made to the exclusion of septic peritonitis, the treatment is simple and effective. It is the free hypodermic use of morphine in doses sufficient to allay all nervous irritation, to induce sleep, and, above all, to give the stomach and bowels rest. Under the influence of morphine food is retained, and in two or three days the patient recovers. The indication also is for hypodermic injections of strychnine, one-thirtieth of a grain every four hours, and for rectal alimentation.

Obstruction of the Bowels as a post-operative accident is not uncommon.

*Causes.* In addition to non-surgical causes which may at any time be present are those causes that result directly from the operation. The bowel may be bent sharply upon itself—*i. e.*, knuckled so as to make occlusion at the point of flexure. If at the same time adhesions form at or near the point of flexure, immobilization takes place; the bowel cannot straighten itself, and the obstruction is established. Sometimes a part only of the circumference of the bowel is constricted either in a hernial opening—Littre's hernia—or between bands of adhesion. The diverticulum looks like a nipple as it protrudes from the convex surface of the intestinal loop. On relieving the constriction the nipple disappears, leaving a deeply indented, dark blue ring. This form of hernial obstruction is partial, and therefore less severe than when the bowel is entirely occluded. Vomiting is less free and less apt to contain feces. Flatus in small quantities may continue to pass. The downward passage of feces is not always wholly interrupted. In cases of vaginal section when the wound is left open and the gauze drain used, the space occupied by the drain may upon the removal of the drain receive a mass of intestine. The result may be adhesion and obstruction. Occasionally a loop of bowel works its way between the margins of the wound, becomes pinched, occluded, and adherent. This is not a very infrequent result of capillary vaginal drainage. The evils of drainage have been more fully stated in Chapter VII.

Clearly, adhesions are more apt to occur between surfaces not covered with peritoneum; hence the importance of careful plastic work during the operation, to cover, so far as possible, all exposed surfaces.

*The diagnosis* is the same as for obstruction of the bowel from other causes. Nausea, vomiting, first of bile, finally of feces, abdominal distention, and rapid pulse are among the prominent symptoms. Peritonitis is first local and confined to the affected part, but later may become general. Death usually follows in a few days, unless the patient is relieved by surgical means. The diagnosis once made, no time should be lost in relieving the obstruction or in making an artificial anus above the obstruction. If the artificial anus is made, a later operation may be necessary to restore the integrity of the bowel and close the sinus. In many cases, however, both of these results finally occur without a secondary operation.

One should be careful not to confound intestinal paresis with obstruction. The former may take place as the result of peritoneal sepsis, already explained. Obstruction may be simulated by conditions relatively much less grave.



**Sinuses.** The local infection above described commonly subsides on drainage. Sometimes the source of infection is continuous; then the drainage track becomes a sinus, and may continue to transmit pus until the infective substance is removed. This substance is usually an infected ligature or intra-abdominal suture which refuses to be cast off. It may remain for months or years a continual nidus of infection and suppuration, or may at any time come away. Spontaneous closure of the sinus upon the removal of the infective substance is the almost invariable rule. If not spontaneously thrown off, such ligatures or sutures may often be caught and fished out by means of an instrument acting on the principle of a crochet-needle, or by means of a very small, dull curette. Should these fail and the discharge continue for a number of months, the indication is to cut down and remove the offending cause. The operation is usually simple and relatively safe. An incision through the abdominal wall in the track of the original wound commonly enables the operator to dilate the deeper part of the sinus and seize the ligature; if not, the adherent viscera may be carefully separated until the nidus is reached and removed.

Long-continued suppuration is a reproach to the surgeon; it is annoying, irritating, and, even though slight, tends to produce degeneration of the kidney and other important organs; hence the importance of efficient measures for its prevention or for the removal of the offending source.

**Prevention.** The use of absorbable catgut sutures and ligatures—which, if prepared by the formaldehyde or dry-heat process, may be absolutely sterilized—see Chapter II.—is an almost universal preventive. Silk, silkworm-gut, metallic, and other non-absorbable sutures and ligatures are, for the reasons indicated, not generally used in peritoneal surgery.

**Fecal Fistula.** The bowel during an operation may be opened or so injured that an opening is liable to occur later. In either event the injury should be repaired before closing the abdomen. In a small proportion of cases the intestinal sutures fail, or the bowel, at some unsuspected point, opens. The result usually is local infection, as described on page 130, followed by a fecal fistula, with discharge of the bowel-contents through a sinus in the wound.

The fistula, in a majority of cases, if left a few days, weeks, or months, will close spontaneously. Closure is usually more prompt in sinuses through the vaginal than through the abdominal wound. The explanation of this may be that the sinus is shorter and the vaginal wound less accessible, and therefore less tampered with. If the fistula does not finally heal, an operation for its closure may be necessary.

Urinary fistula follows the same general laws as fecal fistula. The former seldom occurs except where the bladder was accidentally opened in the operation and the sutures for its closure have failed. The presence of the fistula is recognized by the appearance of urine through a sinus opening through the wound. The treatment is to introduce a self-retaining catheter and keep it in the urethra until the fistula closes. Secondary sutures are seldom required.

**Stitch-abscess.** Suppuration in the abdominal wound may usually



be avoided by scrupulous asepsis. If it occurs, the sutures, unless buried, should be removed and a wet dressing applied. The dressing may be of gauze wet with a saturated solution of boric acid. Complete healing usually follows in a few weeks. In aggravated cases the abscess may have to be opened and drained.

**Removal of Sutures.** One may carelessly cut the loop on both sides of the knot; the end of the loop then retracts below the surface and cannot be reached; if it does not become encysted there will be suppuration around it, which will persist until it works out, is fished out with a crochet-needle, or an incision is made for its removal.

**Ventral Hernia.** The chief causes of ventral hernia are the drainage-tube—see page 120—and improper closure of the wound. The treatment is to reopen the abdomen in the old cicatrix, split the sheaths of the recti muscles, and reunite the wound as directed for ordinary closure on page 111.

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## CHAPTER IX.

### THE RELATIONS OF DRESS TO THE DISEASES OF WOMEN.<sup>1</sup>

THE manner of living, the environment, food, sleep, work, rest, recreation, exercise, and clothing must necessarily have a determinate influence on the prophylaxis and cure of disease. The gynecologist, therefore, who gives to this subject its true weight will stand upon a decided vantage ground over that one whose resources are limited to drugs, local treatment, and operative measures. One of the most serious of all obstacles to the prevention and cure of the diseases of women is fashion in dress.

So long as sensible dress appears eccentric and excites ridicule, women will adhere to the prevailing modes, and will therefore be hampered not only in the pursuit of recreation and exercise, but also in the performance of the more essential physiological functions. Under such conditions fashion must continue to prevail against strong nerves, powerful muscles, and robust health. As soon as the girl passes from the nursery to the drawing-room, and the dress of childhood is changed for the conventional dress of fashion, some of the evils of what we call civilization become manifest. She can neither walk, run, nor even breathe without embarrassment. The fact that woman has endured and survived the tyranny of dress for centuries without more serious results, says Emmet, is convincing proof of her power of endurance.

The prevention and cure of the diseases peculiar to women require the fulfilment of three principal conditions in dress :

<sup>1</sup> The writer, in this presentation of this subject, has adapted freely from the works of Dr. Robert L. Dickinson, of Brooklyn, and Dr. J. H. Kellogg, of Battle Creek.

1. Even distribution for uniform protection against cold and wet.
2. Freedom from waist constriction.
3. Freedom from traction.

1. **Even Distribution.** Uneven distribution is conspicuous in the prevailing modes of dress. The undergarments are usually of cotton or other light material, are often sleeveless and low in the neck. A profusion of skirts hang loosely about the lower extremities and give them relatively little protection. The outer garments are usually of thin material, and, according to the caprice of fashion, may or may not cover the arms, neck, and upper part of the bust. The bonnet is useless for protection. The feet are often held in the vise-like grasp of thin, high-heeled coverings which more resemble stilts than shoes. They expose the woman to great danger from cold and prevent free exercise. In contrast with such inadequate protection for the upper and lower extremities, the waist and hips are swathed and compressed in a "torrid zone" of whalebone, corsets, belts, steels, skirts, and other cumbersome material.

2. **Waist Constriction.** This comes chiefly from the corset, which not only constricts the waist, but dislocates the thoracic viscera upward and the abdominal viscera downward. It restrains the abdominal and dorsal muscles, and may cause them to atrophy from disuse. It prevents, by its stiffness, the undulatory movements of the abdominal walls, and restricts peristalsis.

Normal breathing requires the lungs to be expanded in all directions, and is therefore not costal nor abdominal, but a combination of each. Waist constriction immobilizes the abdomen, and thereby prevents abdominal breathing. This involves a loss in lung power which cannot be supplied by any compensatory increase in costal breathing. Moreover, the diaphragm, from upward pressure, and the pelvic floor, from downward pressure, are rendered inactive and atrophic, and are thereby unable to make their upward and downward movements which normally should be transmitted to the abdominal and pelvic viscera. The physiological importance of these respiratory movements is very great. They are a sort of natural massage. The descent of the diaphragm with each inspiration increases the pressure in the abdominal cavity and lessens that in the chest. The reverse of this occurs with expiration.

Alternating pressure and relaxation upon the blood and lymph vessels secure free circulation. Alternating contraction and relaxation of the muscular bundles of the uterine ligaments and of the other elastic and muscular parts of the pelvic floor serve to maintain their normal nutrition and tone. Alternating rest and motion are essential to the health of the organs and their supports; waist constriction immobilizes them and stops their physiological movements. The pelvic veins empty into the greatest area of corset pressure; the long and perpendicular column of blood which they contain is by this pressure dammed back upon the pelvic organs, especially upon the ovaries. The consequence is passive congestion, an unfailing source of disease. Even the loosely-worn corset excites great downward pressure whenever the woman stoops forward, as she must do in sitting and rising. Sewing-

women, clerks, writers, and students who wear corsets are especially subject to this evil.<sup>1</sup> Figure 94.

The garter is injurious from its tendency to obstruct the venous circulation in the legs.

3. Freedom from Traction. The abdominal and dorsal muscles and the hips have to carry the weight of numerous skirts and such other garments as usually oppress that area. In the unequal effort to sustain this, the muscles become permanently tired, lose their tonicity, and are powerless to prevent a still further increase of downward pressure upon the pelvic floor and pelvic organs.

FIGURE 91.

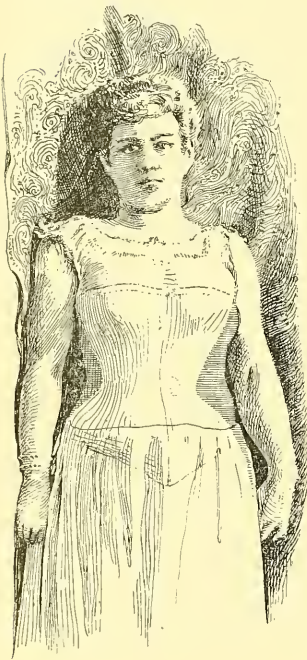


FIGURE 92.

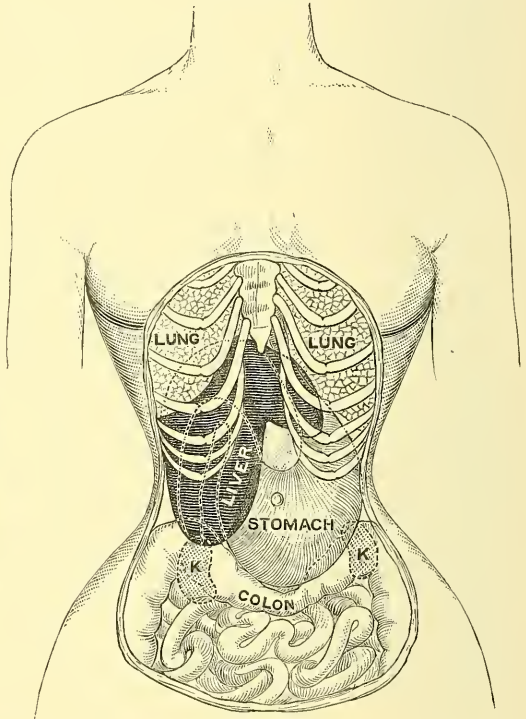


Figure 91.—Girl in corset and without corset. An exact reproduction of a composite photograph. Note the two outlines at the waist.<sup>2</sup>

Figure 92.—A corset-deformed figure, showing the displacement of stomach, liver, colon, and kidneys.<sup>3</sup>

Figures 92 and 93 are given to illustrate some of the evils of undue pressure and uneven traction.

To compare ordinary modes of dress with those which give freedom of motion, “one has only to look at a lot of girls on the way to the gymnasium,” said a Vassar teacher. “They drag along; they have

<sup>1</sup> Adapted from R. L. Dickinson. Hare's System of Practical Therapeutics, vol. iii. pp. 732, 733.

<sup>2</sup> Dickinson. Hare's System of Practical Therapeutics.

<sup>3</sup> After Kellogg.



no spirit or spring in them ; they are in their ordinary clothes. Look at the same set coming on to the gymnasium floor in their light togery ; they skip and dance and run in the liberty of their unrestrained and untrammelled motion ; they are different beings."

FIGURE 93.

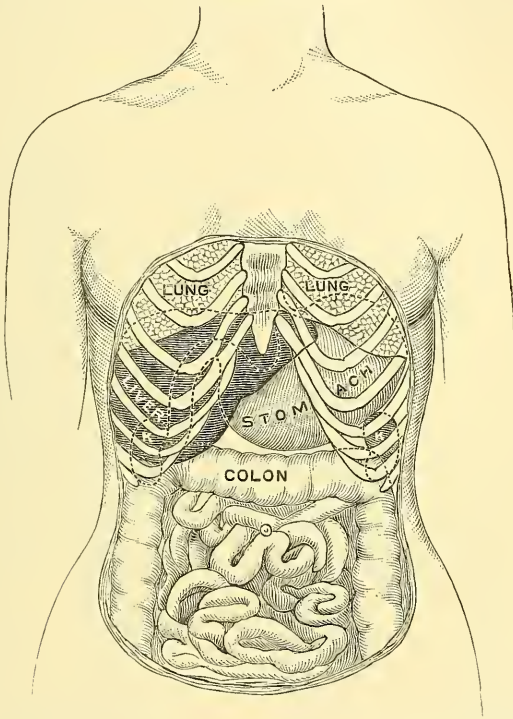


Diagram of a normal figure, showing the internal organs in their normal positions.<sup>1</sup>

In laying aside waist constriction avoid half-way measures, such as loosening the corset or substituting the so-called health-waist which too often is only an aggravated form of corset. Leaving off the corset altogether and retaining the numerous skirts with their bands and belts to drag upon the waist and hips rather increase than lessen the evil. The only judicious compromise is temporary support by means of a suitable waist having little or no stiffness, which shall cover the shoulders, and upon which skirts, drawers, and other garments may be buttoned, so that their weight may be distributed over the shoulders. This should be worn, if at all, only during the period of aggravated weakness, especially weakness of the back, which follows the withdrawal of the corset and continues until the weakened abdominal muscles have regained their tone.

The conventional dress consists of four garments hanging from the

<sup>1</sup> After Kellogg.



shoulders and five from the waist, namely, undershirt, chemise, corset-cover, dress waist, underdrawers, white drawers, corset, flannel skirt, dress skirt. Counting each band as two thicknesses, these make seventeen layers about the waist, and allowing twenty-five inches as waist circumference, these seventeen layers if joined end-to-end would make a bandage thirty-four feet long. See Figure 95.

FIGURE 94.



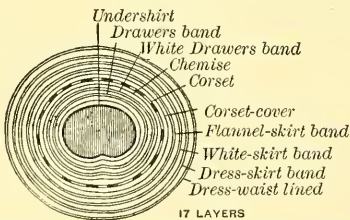
Forward bending. Corset steels forcing the pelvic organs downward.<sup>1</sup>

Hygienic dress requires four garments, namely:

1. Union undergarment.
2. Equestrienne tights.
3. Muslin waist and skirt.
4. Dress in one piece, or so made that its principal weight may be distributed over the shoulders, bust, and hips. This makes four layers about the waist. See Figure 96.

1. The union undergarment is a union of the undershirt and drawers in one piece; the open stride is supplied with a broad flap, as a protection to the external genitalia and to guard the other garments from their secretions. The material of the suit may be silk, wool, or cotton, or any mixture of these. In winter it should be heavy, with high neck and long sleeves, and should reach to the ankle. In summer it may be lighter, with lower neck and short sleeves and should reach to the knee.

FIGURE 95.



Layers of material about waist in old style of dress.<sup>2</sup>

FIGURE 96.



Layers of material about waist in new style of dress.<sup>2</sup>

2. The equestrienne tights reach from waist to ankle, correspond to the man's trousers, are the substitute for the heavy woollen petticoat, and are designed for out-door use in winter.

3. The muslin skirt and waist are often made in one piece, but there are practical advantages in making them separate. The waist, if separate, should reach well down over the hips, and the skirt, made without band, should be buttoned to it. The open stride of woman's garments is a patent source of infection, since, in conjunction with the dust-

<sup>1</sup> Steele-Adams. "Beauty of Form and Grace of Vesture."

<sup>2</sup> After Dickinson. Hare's System of Practical Therapeutics.

sweeping skirts, it exposes the external genitals to the entrance of dust and other fine particles, which are always irritating and often the vehicle of infectious bacteria. Closed muslin drawers are therefore desirable as a means of protection, and these also may be buttoned to the waist.

4. The dress may be in one piece after the "princess" pattern, or if in two pieces, the skirt, unless too heavy, may be attached to the waist with hooks, in which case its lining may be continued over the shoulders in the form of a carefully-fitted skeleton waist.

FIGURE 97.



FIGURE 98.



Figures 97 and 98 are not imaginary, but real representations of a stout woman who changed the conventional dress and a sluggish life for proper dress and normal conditions of food, breathing, and exercise. The transformation was wrought in a few months.<sup>1</sup>

The garments just described may be modified in many ways to suit individual requirements and tastes. But the essential principle must be observed, viz.: uniform distribution, freedom from undue weight and traction, and freedom from constriction. Light whalebones may be useful in the waist-seams for very stout women with pendulous breasts. Proper dress and consequent freedom of motion will stimulate the

<sup>1</sup> Modified from Steele-Adams.

woman to out-door exercise and indoor gymnastics, which, if followed with system and perseverance, will usually give normal tone to the abdominal and thoracic muscles and normal firmness to the breasts. Artificial support is therefore to be discouraged except in aggravated cases.

Union undergarments of all grades and descriptions, adapted to the needs and circumstances of all classes, may now be found in the shops. Economy, health, comfort, and, to the properly educated sense, beauty, all combine on the side of proper dress. It is marvellous that the monstrosities of fashion have so completely overshadowed the natural beauty of form and figure. From the stand-point of beauty shall we choose the natural lines of the body or the artificial lines of the corset, the garment fitted to the woman or the woman fitted to the garment? Imagine the attempt to add to the dignity of the lion or to the beauty and grace of the greyhound by the use of artificial means to change the natural lines of their bodies. Throwing aside the all-controlling bias of fashion, who shall say that the woman is so inferior to the lower animals in form and figure that she must be taken-in in some places and let out in others?

“ Nature is made better by no mean,  
 But nature makes that mean.  
 Over that art which you say adds to nature,  
 Is an art that nature makes.”<sup>1</sup>

<sup>1</sup> Herbert Spencer. First Principles of Philosophy.

# PART II.

## INFLAMMATIONS.

### CHAPTER X.

#### INFECTION AND INFLAMMATION OF THE REPRODUCTIVE ORGANS.

##### General Considerations.

INFECTION of any one of the reproductive organs is liable to have the closest relations to similar infection of a part or of all the others; for this reason an intelligent consideration and satisfactory explanation of the morbid process in any one organ may necessitate a study of the infection of the pelvic organs as a whole.

The distinction between infection and inflammation is of the greatest practical importance. Infection is that condition in which foreign media of irritation have gained access to the body, and, either mechanically or by means of their products, disturbed its functions. These media are capable of being transmitted to other individuals. In most cases, at least, the invading irritant, if known, is of bacterial origin. The organisms, unless arrested, are prone to multiply rapidly, to spread into new territory, to transmit their toxic products to the general circulation, and may even destroy life.

The local territory irritated by the organisms and their toxins becomes a centre to which leucocytes in variable numbers rapidly migrate, and in this way the process often called sero-plastic infiltration is established. By this infiltration a limiting wall is formed around the infected space. This wall confines the infective process to narrow limits, and may protect the general system against the poison. The formation of the limiting wall gives rise to heat, redness, pain, and swelling; this is inflammation. In view of these facts inflammation is not really the disease, but an effort to limit the disease. The almost universal use of the word inflammation to signify the disease makes it difficult in the description of the morbid processes to conform to the ideas above expressed. The attempt will, however, be made to use the two words infection and inflammation in their proper relations.

##### Etiology.

It is important to remember that the study of infection of an organ or a group of organs is simply the study of their anatomy and physi-



ology as modified by that infection. The inflammatory process has been defined as the reaction which living tissue exhibits to morbid irritation. This definition being correct, two conditions must be essential for the development of the infection.

1. The soil must be prepared and ready to react to the morbid irritation. Clearly tissue which has the power to resist the irritation and to hold it within physiological bounds will not inflame.

2. The irritating influence must be present.

These conditions divide themselves into predisposing and exciting causes. The predisposing causes may be systemic or local.

The **Systemic Predisposing Causes** include whatever tends to render the system less resistant to morbid influences. The so-called diatheses fall under this head: anæmia, diabetes, rheumatism, gout, lithæmia, and cholæmia are examples.

The **Local Predisposing Causes** comprise whatever contributes to make the organs an accessible and receptive soil for infection. They are obvious in the following anatomical and physiological conditions: The genital tract, from the vulva to the peritoneum, is an open canal, patent to the atmosphere below and terminating above in the free open ends of the Fallopian tubes. It is not only open to such microbial germs as abound in the air and penetrate everywhere, but also a place of deposit for virulent bacteria.

The rupture of the capillary vessels of the endometrium in menstruation and of the Graafian follicles in ovulation, although physiological, results in solutions of continuity and in hemorrhage, and is therefore traumatic. These traumatisms and the menstrual engorgement of the pelvic organs under healthy conditions pass by with little or no discomfort, but if some morbid irritation upset the normal balance of nutrition the menstrual congestion may become pathological and may be the first stage of an inflammation, or the morbid congestion may be set up in the intermenstrual period independently of the menstrual congestion. The liability, however, to inflammation during the menstrual week is greater.

In addition to the physiological traumatisms already mentioned, the traumatisms of parturition, of abortion, of improper local treatment, and of operations still further open the way for the entrance of infection. Violent coitus, masturbation, the careless use of the unclean catheter, impure water in bathing, and soiled linen in the toilet are some of the means by which gonorrhœal, syphilitic, and other infections may develop in the genital tract.

The conditions of utero-gestation, parturition, and the puerperium are more perilous, hence infection of the puerperal woman is more destructive. Decomposed secretions and the products of fatty degeneration from involution and from the menopause favor the development of pathogenic microbes. Tumors, displacements, tight lacing, and constipation are among the common local predisposing causes of morbid congestion in the pelvis. The predisposing causes already outlined clearly supply the first condition of infection—preparation of the soil.

The **Exciting Causes** comprise agents which have the power to produce and to maintain morbid irritation. Greatly preponderating,

at least among these, are the pathogenic microbes and their products. The extent to which inflammation may be produced by irritants of non-bacterial origin without the presence of any bacteria whatever is a question not fully settled. Among the pathogenic microbes not seldom found in the genitalia are the straphylococci and streptococci of suppuration, the bacillus tuberculosis, the bacillus coli communis, and the pneumococcus of Frankel. Bladder parasites and the saprophytes from the rectum and colon have easy access. See Chapter II., on Antiseptics and Asepsis. The bacillus coli communis lives in acid media, and can thus easily pass through the acid secretion of the vagina to the uterus.

The *Gonococcus of Neisser*, one of the most frequent, destructive, and insidious factors in genito-urinary infection, is elsewhere partially discussed under the subjects Vulvo-vaginitis, Salpingitis, and Acute Metritis. Its chief power for harm lies in the lasting vitality of the germ long after apparent cure. The gonococcus may remain inactive in the mucous crypts, liable at any time, even while quiescent in the individual, to be communicated to another. Hence many an innocent and previously healthy woman, shortly after marriage to a man who supposed himself to have been cured of gonorrhœa years before, may by contact with the attenuated virus get a destructive gonorrhœal infection of the genito-urinary organs.

Some most important observations have been made by Wertheim. He reports that human serum agar is the best culture ground for gonococci. In this culture at 40–43° C. they retain their full reproductive capacity. A direct experiment from pure culture from a gleet discharge of two years' standing gave the following interesting results: 1. Attempted reinfection of the original urethra with this culture was always a failure. 2. The culture when transplanted to a coccus-free urethra produced typical acute gonorrhœa. 3. Infection from this back again to the original urethra gave a fresh gonorrhœa, which, after a typical acute course of five or six weeks, again subsided into a chronic gleet. Thus, by passing the gonococci through another individual, that is, through a new culture ground, they become again virulent to the urethra which was invulnerable to them before.

This explains the fact that an apparently healthy subject of chronic gonorrhœa may infect his hitherto unaffected wife and become again infected from her—*i. e.*, the gonococci by passing through the new culture of the wife again become virulent for the husband. In due time each becomes tolerant of the germ which, however, may develop acute infection in another person. The common notion that gonorrhœa in women may be chronic from the beginning is weakened by the experiments of Wertheim. We can now understand why the gonococcus, even after years of apparent cure, may regain its full virulence.

The greatest danger is of extension to the Fallopian tubes. This will be further considered in the chapter on Salpingitis. The microbe may be found in the uterus and tubes long after it has disappeared from the vagina. The pavement epithelium of the vagina and the presence of the lactic-acid bacteria normally found there by Döderlein, page 153, make the vagina relatively immune. The crypts of the

uterine and tubal mucosa furnish a ready resting place for the germ.<sup>1</sup> Even here, in many cases, it is only found during the exacerbations. Menstruation favors, but does not insure its revival. It may for long periods remain concealed in a semi-quiescent state, a destroyer of health, a menace to life. The frequency of chronic gonorrhœa—the latent gonorrhœa of Noeggerath<sup>2</sup>—has been variously estimated. There are reasons to fear, however, that the percentage is very high. Sanger<sup>3</sup> announces that 25 per cent. of his hospital and private patients have gonorrhœa. Lomer<sup>4</sup> found the diplococcus in fully 60 per cent. of the cases in Schroeder's clinic. One observer places the average as high as 80 per cent.

The statistics above quoted are taken from clinics largely made up of prostitutes and semi-prostitutes, a fact which will necessarily modify a judicial estimate of their value. It is, moreover, essential to appreciate two other facts: first, the evidence on this most complicated question, although sufficient to lead to the greatest apprehension, is not yet sufficient to establish definite and undeniable proof on the extreme side of the question; second, many excellent clinical observers in private practice are disposed, on the whole, to qualify the danger of the situation, and to conclude that it is vastly overestimated. If the questions involved were matters only of scientific interest, their solution would properly wait for further and more exact observation. But the "danger and duty of the hour" are concerned with moral, not scientific, problems, and the moral obligation are serious enough to lead the writer to present it even from the *ex parte* stand-point.

Why do large numbers of apparently healthy young women date their pelvic infection from the marriage week? Is it, as one author declares, the "fatigue and excitement of the wedding journey"? Why do so many women with perfectly developed reproductive organs remain sterile from the time of marriage or after the birth of a single child and a dangerous "child-bed fever"? The causation of too many of such cases of hopelessly diseased uteri, tubes, and ovaries, not to mention proctitis, with sometimes rectal stricture, urethritis, cystitis, pyelitis, and nephritis, has been explained by the word idiopathic. Their histories, if written, would often tell of an apparently cured gonorrhœa before or after marriage in the husband. If the most destructive infection may follow contact with a subject of gonorrhœa after the discharge has ceased, how perilous must be the slight gleet discharge so often disregarded! Young men are sometimes advised to marry in order to improve their sexual hygiene, and so to cure an intractable chronic but "innocent gleet." Such advice may result in the destruction of the reproductive organs of an innocent woman. It is doubtless possible, perhaps not unusual, for gonorrhœa to be so cured that the individual cannot transmit the disease. Failure, however, to cultivate the gonococcus from the urethral secretions does not prove its absence. So long as it can be cultivated, marriage is pro-

<sup>1</sup> Steinschneider. Berliner klinischer Wochenschrift, 1887, No. 17. From Pozzi.

<sup>2</sup> Noeggerath. Latent Gonorrhœa. Trans. Amer. Gyn. Society, vol. i. p. 268, 1876.

<sup>3</sup> Sanger. Ueber die Beziehung der Gonorrhöischen zu Infektion zu Puerperal Krankheiten. Verhandlungen der Deutschen Gesellschaft für Gynäkologie. Leipzig, 1886.

<sup>4</sup> Lomer. Deutsche medicinischer Wochenschrift, 1885, No. 43.



hibited. Repeated attempts should be made in every suspected case. Marriage should be deferred at least until after repeated efforts have failed. A gonorrhœal record does not necessarily settle, but it always complicates the question whether the individual may safely marry.

#### Pathology and Course.

Bacterial invasion and consequent infection may spread and may involve any or all of the genito-urinary organs by either or both of two routes.

1. By continuity of mucosa.
2. By the lymphatics or bloodvessels.

**Infection by Continuity of Mucosa.** The course is usually upward from the vulva or vagina, through uterus and the Fallopian tubes to the ovaries and peritoneum, or through the urethra, vagina, bladder, and ureters to the kidneys. The numerous glands of the vulva are strongholds where the virus may intrench itself and whence the constant supply may find its way to the organs above.

The vagina, advantageously covered with pavement epithelium, is relatively smooth, like skin, and supplied with an acid secretion. Bacteria, therefore, find lodgement there less easily than in the vulva. Moreover, the acid medium is unfavorable to the culture of about 90 per cent. of all pathogenic microbes. This also makes the vagina a difficult barrier to pass.

The uterus, although protected by these anatomical and physiological conditions of the vagina, is itself especially vulnerable on account of the loose arrangement and thinness of its epithelial covering, the villous network of its arbor vitæ, the confluence and ramifications of its glands, and the richness of its periglandular and perivascular network. By reason of these conditions the cervix uteri is adapted to receive, retain, and distribute infection. Were it not for the muscular constriction at the external and internal os and the utero-tubal constrictions, the frequency of infection of the endometrium, already great, would be much greater.<sup>1</sup>

The Fallopian tubes are embryologically and anatomically continuous with the uterus; are, in fact, a part of it, and subject to the same causes of infection. The ovaries and pelvic peritoneum, in direct communication with the tubes, may receive infection from below. Infection by continuity of mucosa, however, although usually from that direction, does not always come from below; it may reach the ovaries and pelvic peritoneum from above, and descend through the tubes, uterus, and vagina to the vulva. Tubercular infection, for example, usually goes in this direction.

Infection by the Lymphatics and Bloodvessels is undeniable in puerperal women. The traumatism of parturition, often very extensive all the way from the uterus to the vulva, may open wide the door for infection to be transmitted by this way. The destructive influence of the inflammation, phlebitis and lymphangitis, on the vessels them-

<sup>1</sup> Bonnet and Petit. *Traité Pratique de Gynécologie.*



selves may seriously and permanently impair the nutrition of all the pelvic organs.

The route by continuity of mucosa, save in puerperal cases, is generally accepted, and that by the lymph and bloodvessels is often denied. If infection is often transmitted from the genitals by way of the lymph vessels to the inguinal glands—the bubo is proof of this—it is evident that it may also travel by way of lymph vessels a much shorter distance, from the vagina or cervix to the parametria, perimetria, and tubes. This reasoning by analogy has been verified by experiment. Some observers, notably Lucas-Championnière,<sup>1</sup> claim that this is the more common mode of infection. Wertheim, from experimental investigation on white mice, rabbits, dogs, guinea-pigs, etc., concludes that the gonococcus infection can pass through pavement epithelium and connective tissue, and thus reach and be carried by the lymphatic and vascular channels from the vagina or cervix to the ovaries, tubes, and peritoneum, producing thus ovaritis, salpingitis, and peritonitis. Giglio<sup>2</sup> also experimentally demonstrated that infection may travel from the vagina, cervix, and bladder to the broad ligaments and may produce extra-tubal pelvic abscess. He maintains that infection by the vessels is more frequent than by continuity of surface. When the latter occurs he claims that it is more commonly in the descending order from the tubes to the uterus. This statement of Giglio may have to be revised.

Continuous infection does not always mark the course of the microbes through the vessels. They colonize at the points of least resistance; hence the tubes may suppurate and the ligaments and ovaries go free. When, however, the microbes travel by way of the mucosa a continuous inflammation is usual, though not invariable.

Infection by the veins is specially common in puerperal cases. It has often produced general septicæmia and pyæmia through very slight lesions. The arteries also may carry infection. This is proved by the fact that bacteria have been found in places where they must have been carried by the centrifugal circulation; for example, the gonococcus in the knee-joint.<sup>3</sup> Hetero-infection of the genitalia—*i. e.*, infection from without—is not the invariable rule. Diseased organs may send their germs by way of the lymphatics or bloodvessels, and produce secondary infection of the pelvic peritoneum, ovaries, tubes, and other genitalia. Tubercular infection of the tubes, secondary to that of the lungs, is a familiar example.

Experiment and clinical observation also show that both puerperal and non-puerperal infection may travel by bloodvessels, by lymph channels, and by continuity of surface. The relative frequency, however, of these modes of transmission is a matter of speculation. Possibly the route by continuity of surface is really a superficial lymph route; that is, the infection may travel along the lymph channels of the mucosa.

<sup>1</sup> Paris Surgical Society Transactions, December, 1888. New York Medical Journal, March 22, 1890.

<sup>2</sup> Giglio. *Annali di Ostetricia e Ginecologia*, May and June, 1893.

<sup>3</sup> Lüther. *Sammlung klinische Vorträge*, 1893.

### Classification.

Let us now raise a question relative to the looseness and confusion of the current classifications. The term simple infection as distinguished from septic, for example, has no strict pathological meaning. It is not yet settled whether the so-called simple infection is aseptic or whether it is only slightly septic. We know that an infection seemingly very mild may readily take on a decidedly virulent character. We may think of the infective or inflammatory process in several ways. 1. As having gone only into the congestive stage. This would be a mild form. 2. As having gone on to the stage of effusion or suppuration. 3. As being the result of a mild or more virulent infection. 4. As occurring in structures of greater or less resistance. What is there in such conditions to designate on the one hand as simple, on the other as septic? In the present state of our knowledge we must use for descriptive purposes an adaptable, and therefore flexible, nomenclature. In this nomenclature words like simple and septic can have only a loose clinical significance. They cannot be utilized as the outcome of scientific classification. We might simplify the subject by throwing out such words as simple.

A distinction between acute and chronic inflammation, since these conditions enter extensively into the pathology of the diseases of women, is most important. Many deny altogether the existence of chronic inflammation, for example, of the endometrium. Some attribute the condition which is usually classed under that name to congestion; others call it a subinflammatory state. It may be well to remark that an essential factor of inflammation—round-cell infiltration—is found in those chronic conditions, and that they may therefore be properly classed as inflammatory; this migration of blood-corpuscles, however, occurs more slowly, and may in some cases not occur at all. In this respect the difference between acute and chronic inflammation is one of degree. We shall avoid the question whether certain conditions should be called congestive, inflammatory, or subinflammatory. The discussion of this question is long, tiresome, and unprofitable, a contest largely of words. The following outline of some of the phenomena of inflammation will help to make clear the distinction between acute inflammation and the conditions which are usually grouped under the name chronic inflammation.

The inflammatory reaction which living tissue exhibits to morbid irritation is first defensive and then constructive or reparative. The defensive process is an effort to circumscribe the disease by throwing around it a limited wall of exudate; the morbid action thus confined and concentrated within narrow limits is within these limits more or less intense and destructive. It may result in the sacrifice of a part for the safety of the whole. The force of the disease is spent in the destructive process, and may be active only or chiefly within the limiting wall. Finally, normal conditions of nutrition are re-established, the constructive or reparative process becomes active, and the limiting wall is absorbed. If the constructive process continues until repair is

complete, and then ceases, the part will resume its normal functions ; the inflammation will be at an end.

**Acute Inflammation.** If the infection is of such virulence or of such character as to call forth the defensive processes just described, and to produce blood stasis with more or less severe swelling, pain, heat, and redness, and finally to produce local destruction, the inflammation is acute. The disease may terminate with resolution or go on to suppuration.

**Chronic Inflammation.** If the irritation is of minor intensity, or in any other way of such character as to fall short of provoking much defensive action, there will be little or no limiting wall, and consequently no intense destructive process concentrated within a circumscribed space ; heat, swelling, pain, and redness, if present, will be more diffuse and less pronounced. Under these conditions there is a minimum of defence and an excess of construction, and the inflammation is chronic.

Chronic infection may follow acute infection, or may have been sub-acute or chronic in the beginning. The excessive constructive action which belongs to it explains the hyperplastic and hypertrophic results of so-called chronic metritis. It also explains certain morbid nutritive changes in the blood and lymph vessels of the pelvis and in the cellular tissue of the pelvis. Sclerotic changes in other organs, such as arterial sclerosis and interstitial nephritis offer a close analogy.

It is unprofitable to speculate on the question whether the conditions just described under the name chronic inflammation would better be classified as congestive or as subinflammatory states. They are recognizable under either of these names. They occur more frequently in neuropathic women, and especially in cases of the various diatheses, anæmia, lithæmia, gout, cholæmia. Diabetes, also, is a strong predisposing cause. They are usually less dangerous to life and often more destructive to health than the acute inflammations. They constitute a large proportion of the ailments of women and include some of the most distressing ailments. They are persistent and hard, and often impossible, to cure. In such cases it is often difficult to draw the line between those congestions which fall short of inflammation and actual inflammation. One of the most common forms of so-called uterine catarrh is that which occurs in women of *deficient eliminative power* ; that is, the bowels, kidneys, and other eliminative organs fail to throw off sufficiently the waste products. Under these conditions the mucous glands of the uterus, for example, whose function is not excretory, may vicariously undertake to make good the deficiency. An unspeakable amount of *misdirected* and *injurious* local treatment is constantly being applied to the endometrium in such cases.

The significance of pelvic infection varies according to the resistance of the patient, to the location and nature of the structures involved, and to the virulence of the causes which produced it. Strong predisposing causes make the woman less able to resist morbid irritation, and infection once established is more likely to be severe and progressive. If infection is confined to superficial areas its gravity is relatively much less than when deeper structures are diseased. Endometritis, for ex-



ample, is less serious than an inflammation involving the uterine wall or the parametric lymphatics and veins. Moreover, the same infection may be somewhat more serious in some places than in others. This may be illustrated by the case of a man who picked his teeth with a vaccine point and experienced a most distressing result. Some bacteria are harmless and some only mildly virulent. The gonococcus, for example, is more general, and therefore more disabling than the staphylococcus. The streptococcus pyogenes is more dangerous than either.

From the foregoing it is easy to explain why an infection, even in the deeper structures, if not from very destructive bacteria, may present in the more acute stages most of the subjective and some of the objective appearances of a fatal disease, and yet after a few days terminate in a complete return to health. The reason is also obvious why a superficial vulva infection, apparently innocent, may be the result of a gonococcus or of a streptococcus invasion, and may by continuity of surface, or by way of the lymphatics or veins, finally destroy life, or render it miserable and useless. Some organisms may excite little or no defence—*i. e.*, may not attract leucocytes—and may therefore sweep through the system with rapidly destructive and fatal force. This would be infection without defensive inflammation. The germ of tetanus is an example.

#### Diagnosis and Prognosis.

The symptoms are often utterly disproportionate to the lesions. An infection of little danger may cause the greatest misery; another which directly threatens life may be almost painless. Objective examination should, therefore, especially in acute cases, be thorough. The subjective symptoms may be misleading. The prognosis depends upon the region infected, the general and local resistance of the patient, and the nature and extent of the infection.

#### Treatment.

The treatment requires the individualization of each case, and must therefore be referred to the special subjects.

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## CHAPTER XI.

### VULVITIS, VULVO-VAGINITIS, VAGINITIS.

THE external genitals are the labia majora and minora; the clitoris, with its prepuce; the vestibule, including the meatus urinarius; the fossa navicularis, and the hymen. The hymen separates the external genitals from the vagina. Their covering is cutaneous, although it partakes somewhat of the nature of the mucous membrane.



## Definitions.

Vulvitis is inflammation of the external genitals.

Vaginitis is inflammation of the mucosa and submucosa of the vagina.

Vulvo-vaginitis is inflammation of the vulva and vagina.

The importance of vulvitis and vulvo-vaginitis is commonly underestimated. Inflammation, seemingly trivial, may start in the vulva and rapidly extend to all the reproductive and urinary organs. Its possible gravity may be that of metritis, salpingitis, ovaritis, peritonitis, urethritis, cystitis, pyelitis, nephritis.

## Classification.

The inflammation may be acute or chronic, and it may be classified and its forms recognized :

1. According to the nature of the exciting cause which may have produced it.

2. According to the special structures involved.

**Etiological Classification.** The following inflammations are of bacterial origin. They may occur as vulvitis, as vaginitis, or as vulvo-vaginitis :

Gonorrhœal,	Tuberculous,
Erysipelatous,	Mycotic,
Diphtheritic,	Syphilitic.

The microbe of syphilis has not been cultivated, and is therefore as yet unknown except by its effects. The etiological classification will be of special interest in connection with etiology.

Vulvo-vaginal inflammation is also often caused by microbes which are identical with those producing traumatic infection, such as the staphylococci of suppuration. Mixed infection may be caused by these microbes in connection with those indicated in the above classification.

**Anatomical Classification.** Vulvo-vaginal inflammation may attack special structures, such as the skin, mucous membrane, cellular tissue, glands, and follicle. This is without reference to the particular nature of the micro-organisms which may have been the irritating cause of the infection—*i. e.*, these anatomical forms may come from bacteria of widely different natures. The anatomical forms are :

Superficial vulvo-vaginitis,	Follicular vulvitis,
Senile vulvo-vaginitis,	Furuncular vulvitis,
Glandular vulvitis,	Empysematous vaginitis.
Paravaginitis,	

The classification above outlined cannot from the clinical stand-point always be followed. An effort, however, to differentiate between the various forms should, both for clinical and scientific reasons, be attempted.

Eczema, kraurosis vulvæ, herpes vulvæ, and other allied disorders will be presented in the following chapter. Pruritus vulvæ and vag-

inismus, although often symptoms of vulvo-vaginal inflammation, are of neuropathic significance, and are, therefore, properly classed among the gynecological neuroses. See Chapter XII.

The general consideration of vulvar and vaginal inflammations includes certain factors in etiology, pathology, and diagnosis which are more or less common to all varieties. To avoid repetition and to give a general impression of the whole subject, these factors may be studied before taking up the special form.

#### General Consideration of Etiology.

**Predisposing Causes.** The predisposing and exciting causes have been outlined in the preceding chapter on the Principles of Inflammation. Among the particular predisposing causes of vulvo-vaginal inflammation are the following :

Filth,	Vaginal fistulae,
Obesity,	Excessive coitus,
The diatheses,	Masturbation.

**Exciting Causes.** Numerous bacteria, some of which are indicated in the etiological classification, page 150, together with their products, are undoubtedly among the essential causes of the various forms of vulvo-vaginal inflammation. They include the gonococcus, the streptococcus pyogenes, the staphylococci, the bacillus tuberculosis, the microbe of diphtheria, and the infection of syphilis.

Vulvo-vaginal inflammation is occasionally, and especially in children, a sequel of such acute infectious diseases as diphtheria and scarlatina.

The media of infection may be

1. Pathologic discharges from the uterus or tubes.
2. Discharges from pelvic abscesses.
3. The urine and feces.
4. Carcinomatous discharges.
5. Pediculi pubis.
6. Coitus.

The disease may, especially in cases of severe pruritus, come by extension from the anus; very often the morbid irritation is furnished by organisms from the diseased bladder, ureters, or kidneys. Infection may originate in the vulva or from the surrounding cutaneous surface. It may result from an irritating discharge from some higher zone in the pelvis, or from direct infection.

Filth outranks every other cause, with the possible exception of the gonococcus.

Epidemics and endemics of vulvitis have been recorded.

In fat women of sluggish capillary circulation the vulva is supersensitive to undue irritation. The excessive oily secretions undergo decomposition into fatty acids which cause intense intractable erythema of the vulva, and often of the thighs and nates, a condition aggravated by filth—*i. e.*, by accumulated and decomposed secretions, especially in warm weather, when perspiration is free. Masturbation may be cause or result of the disease.

The determining factors of etiology, especially in chronic vulvo-vaginal infection, are, first, in the predisposition of the patient; second, in the nature of the infection; third, in its location. Badly-nourished, neuropathic, diathetic women are predisposed to chronic disease. Some bacteria, notably the gonococci, are more especially apt to produce intractable infection. The location, however, of the infection in the glandular elements, is a principal factor in the chronicity of the disease. Colonies of bacteria become entrenched in the vulvar glands and follicles, from which fresh infections may travel upward to the vagina and uterus. Similar colonies may exist in the muciparous glands of the cervix, and from this point be distributed not only to the parametria, corpus uteri, tubes, peritoneum, cellular tissue, and ovaries, but also downward to the vagina and vulva. The vulva and the cervix uteri, especially the latter, are the two great distributing points of pelvic infection.

#### Pathology and Pathological Anatomy in General.

Catarrhal, suppurative, hemorrhagic, and ulcerative processes are rather phases than varieties of inflammation. The process is catarrhal when the product is a pathological increase of the normal secretion, suppurative when it contains pus, hemorrhagic when it contains an appreciable amount of blood—*i. e.*, when the destructive process has opened the walls of the vessels or produced diapedesis—and ulcerative when there is localized necrosis. The catarrhal often precedes the suppurative infection by a distinct period.

The skin or mucous membrane in chronic cases usually becomes thick and œdematous. The pyogenic microbe does not produce suppuration until the structures are in a degree impaired. A circumscribed suppurating surface may be surrounded by an area of catarrhal inflammation. The necrotic tendency may not go beyond erosion; it may impair rather than destroy the skin or mucosa, or it may extend far below the surface and form a deep ulcer. Vulvitis and vaginitis may exist separately or together.

So-called granular vulvo-vaginitis is due to swelling and hypertrophy of the vulvo-vaginal papillæ, is chiefly found in the vagina, and, though not confined to that period, is more common during pregnancy. It is characterized by small, round protuberant granulations scattered thickly over the affected surface.

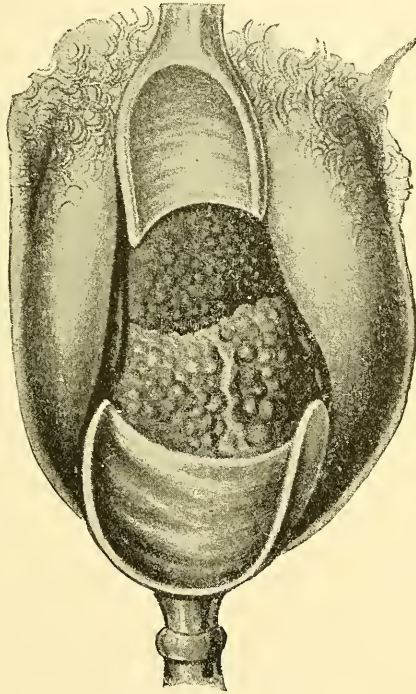
The inflammation may result in extensive ulceration of the vulva or vagina, or both. Sufficient plastic material may be thrown out to cause adhesions more or less firm between the nymphæ or the labia majora, or between the vaginal walls, or between the vagina and the cervix. Partial or complete closure of the vulva is not uncommon in children. Such adhesions usually yield readily to slight force. They resemble the adhesions often found between the prepuce and the glans penis of the male child. These adhesions may be between the clitoris and its prepuce, and may give rise to serious nervous disturbances. The surfaces may be so thoroughly united that they can only be separated by dissection. Strong adhesions are less likely to occur in mar-



ried women than in virgins and aged women whose organs are at rest.

If gonorrhœa be excepted, suppuration is mostly confined to the vulvitis of children, especially children of defective nutrition. The purulent secretion of vulvitis or of vaginitis is creamy, abundant, and malodorous. Numerous minute points of superficial suppuration in a limited area may run together and form an ulcer. In this way many areas of ulceration may be formed. If ulcerative changes involve the small bloodvessels the secretions will be streaked with blood. Bad cases may present hemorrhagic areas, great swelling, and even gangrene.

FIGURE 99.

Granular vaginitis.<sup>1</sup>

Extension of vulvar inflammation to the vagina is common, though not so common as it would be were it not for the following anatomical and physiological conditions in the vagina: it is smooth, and, being covered with pavement epithelium, closely resembles skin, is poor in glands, and is therefore not subject to intense catarrhal affections.

Döderlein<sup>2</sup> has distinguished microscopically two secretions of the vagina, one the normal secretion, a whitish, milky, strongly acid discharge without mucous admixture; the other is a pathological secretion,

<sup>1</sup> From Heitzmann, in Thomas and Mundé's Diseases of Women.

<sup>2</sup> Döderlein. "Das Scheidensekret und Seine Bedeutung fuer das puerperal Fieber." Brochure, Leipzig, 1892, pp. 81. Centralblatt f. Gynecology, 1892, No. 11.



yellowish, faintly acid, often neutral or alkaline, sometimes foamy, and mixed with mucus.

In the normal secretion a non-pathogenic vaginal bacillus is constantly present. Experiments with cultures show that the bacillus gives to the normal secretion its acid reaction, which is due to lactic acid. These normal vaginal bacilli have been found by culture experiments to be unfavorable to the culture of the staphylococcus pyogenes aureus. In fact, the vast majority of pathogenic bacteria do not thrive in an acid medium.

In the pathological secretion pathogenic bacteria were increased and the normal vaginal bacilli were decreased. This secretion usually originates in the cervix uteri, is toxic to animals, and by its hostility to the normal vaginal bacillus, decreases or neutralizes the acidity of the vaginal secretion, thereby affording a favorable culture ground in the vagina for pathogenic bacteria. A lesson to be learned from these observations is to stamp out vulvar inflammation, and thereby prevent its invasion to the higher genitals, especially the cervix uteri.

When vaginitis occurs, the desquamated cells of vaginal epithelium give rise to a thick pasty accumulation of smegma not unlike vernix caseosa. When the epithelium is shed, pus is thrown off from the exposed surfaces.

Vulvo-vaginitis, if superficial, strongly tends to recovery. It becomes obstinate when the vulvar glands already described are involved, and may be intractable when it reaches the muciparous glands of the uterus. Refer to the preceding chapter, for remarks on the relative capacities of vulva, vagina, and cervix to receive, retain, and distribute infection.

Chronic Vulvitis and Vaginitis may occur separately or together. Clinically, chronic vulvitis and vaginitis are more commonly observed than acute; they may follow the acute, or may have been chronic or subacute in the beginning.

#### Symptoms and Diagnosis in General.

The purpose is not so much to give a name to the disease as to furnish a basis of rational treatment. A diagnosis should include, therefore, the source, variety, and complications. It would be absurd to confine the treatment to the area of inflammation if, for example, the disease were secondary to metritis, carcinoma, cystitis, or vaginal fistula. Attention to such complications as fissure in ano, hemorrhoids, rigid sphincter, threadworm, endometritis, often gives relief. The diagnosis should have special reference to the possible extension of the disease into the ducts of the vulvar glands and urinary organs. The discharge from a pelvic abscess has been mistaken for the secretions of vulvo-vaginitis.

The symptom-group in *acute vulvo-vaginal inflammation* comprises irritation, pain, redness, swelling, increased secretion. The systemic symptoms of inflammation are absent or slight, except in cases of extensive phlegmon or suppuration. The pain and swelling are often so intense that the patient must lie down with the thighs apart. Carci-

nomatous ichor causes rather irritation than pain. Frequent urination and dysuria are common. Urination is painful from contact of urine, especially when the infection has extended to the urethra and bladder.

The disease starts with local irritation, congestion, redness, swelling, pain, and heat. The labia minora sometimes swell to twice the size of the finger, and may consequently close the vulva; they have a bright, glistening appearance not unlike the inflamed swollen prepuce of the male. The pain is throbbing and extreme in proportion to the swelling. The inflamed surfaces, which may include both vulva and vagina, are at first dry, but soon become moist in consequence of an effort of the glands to relieve the congestion by increased secretion. The secretion, usually profuse, is a chief factor of the disease. In children the disease, unless due to gonorrhoeal infection, is usually confined to the vulva.

*Chronic vulvar and vaginal inflammations* are recognized by their persistency, by their tendency to recur when apparently cured—see Follicular and Glandular Vulvitis—and sometimes by the presence of granular erosion of the vulvar, vaginal, or vulvo-vaginal surfaces. They are characterized by a scanty, thin, yellow discharge, usually more or less purulent; by great local irritation; by variable redness; by slight swelling, and often by granulation. The surfaces, especially the vulvar surfaces, finally become hard, œdematous, leathery, parchment-like, and painful. A principal symptom of chronic vulvar inflammation is an intolerable, often intractable, itching and burning.

#### Treatment of Vulvar and Vaginal Inflammation in General.

The experiments of Döderlein—see page 153—would suggest vaginal douches of a 1 per cent. aqueous solution of lactic acid.

The vulva is normally moist from its own secretions. Dust and dirt, which may contain irritants capable of exciting vulvitis, easily reach the vulva and find lodgement there. As a prophylaxis against this source of vulvitis, and as a better protection against sudden changes of temperature, the closed drawers should take the place of the commonly-worn open drawers. The daily shower-bath applied to the external genitals is an excellent prophylaxis. Strong soap is irritating, and therefore injurious.

The Treatment of Acute Vulvitis is chiefly local, and includes two essentials, cleanliness and palliation. Mild alkaline solutions, such as sodium bicarbonate, when applied to the vulva, may combine with the oily secretion to form a soap which, upon being washed off with warm water, leaves the surface clean; this should be frequently repeated as a preparation for other applications, such as a wash of equal parts of dilute solution of acetate of lead and fluid aqueous extract of opium, the 4 per cent. aqueous solution of antipyrine, the 4 per cent. solution of cocaine, the 4 per cent. ointment of morphine sulphate, the spray of an alkaline solution, or of the 5 per cent. solution of carbolic acid. The warm sitz-bath or the ice-bag to the vulva is indicated in cases of

extreme irritation and burning. Absolute rest in bed is important. A rectal suppository containing extract of opium, two grains, and extract of belladonna, one-fourth grain, may give relief and secure much-needed sleep. Avoid ointments containing animal fat. Vaseline, clear or stiffened with wax, is a good excipient. If the labia can be separated without too much pain, a light gauze or lint compress saturated with a soothing antiseptic solution may be placed between them.

The general treatment consists of remedies to allay irritation and reduce arterial tension. Small doses of aconite may be indicated. Free action of the bowels by salines is essential. Soporifics and anodynes are indicated for nervous irritation and pain. Bubos and other abscesses should be opened. Great care is needed to avoid carrying the infection from the vulva to the vagina or uterus by the syringing-tube or examining finger.

The Treatment of Chronic Vulvitis includes, in addition to such of the above means as may be indicated, astringents, and, in obstinate cases, caustics. The surfaces should be dressed with gauze compresses saturated with a 1 to 3000 aqueous solution of the bichloride of mercury, or a 3 per cent. aqueous solution of carbolic acid. If the disease has been caused by pediculi pubis or other parasites, mercurial ointment, in addition to the above solutions, should be used to destroy them.

The daily hot-water vaginal douche may be supplemented with a solution of copper sulphate or zinc sulphate, one drachm to the quart of water. Extensive erosion is often promptly cured by the free use of benzoated oxide of zinc ointment. The eroded surfaces, having been dried, may be daily dusted with calomel or with the subgallate of bismuth. In neuropathic cases of severe pruritus almost miraculous relief sometimes follows the free withdrawal of blood from the uterus, either by scarification or by leeches.

Granular inflammation of the vagina may be cured by painting the granulated surface with a 1 to 40 solution of nitrate of silver and daily packing the vagina with gauze. The treatment of vulvo-vaginal inflammation will often demand the removal of a causal endometritis. Obstinate cases often yield to frequent applications of 10 or 20 per cent. of ichthyolate of ammonium in glycerin. The application is best made with a vulvar compress secured by a bandage.

#### SPECIAL FORMS OF VULVO-VAGINAL INFLAMMATION.

The special forms of vulvo-vaginal inflammation will be considered by themselves in the following paragraphs.

##### Gonorrhœal Vulvo-vaginitis.

The gonococcus is one of the most active and most virulent elements in the diseases of women, has been found in all of the genito-urinary organs, and is the cause of a large proportion of the cases of destructive metritis, salpingitis, and ovaritis.

Gonorrhœa is always the result of gonococcus infection. The dis-



ease is characterized by its strong tendency to penetrate and spread, and is prone to attack the follicles and glandular structures of the vulva, especially the vulvo-vaginal glands and Skene's glands. Diffuse deep cellular inflammation and abscess of the vulva may also result from gonococcus infection. See remarks on the gonococcus, and upon recurrent gonorrhœa in woman, page 143.

Gonorrhœa not uncommonly extends throughout the genito-urinary tract, although the constant downward current of urine may in a measure protect the more distant urinary organs. If the infection originates in the vulva it usually extends to the vagina, and *vice versa*. The urethra seldom escapes. The inguinal glands are infected by transmission of the infection through the lymphatics, and are especially prone to suppuration.

Children are more subject to this infection than is generally supposed. It may come from infected bed-linen, from carelessness in bathing with infected cloths or sponges, or from the unclean hands of infected nurses. In children the disease is less liable than in adults to extend to the vagina, because the vagina is protected in a measure by the hymen. It may, however, be easily carried upward on the douche point.

**Diagnosis.** A suspicious exposure, great pain, and unusual systemic disturbance would excite suspicion. Radiation of pain to the rectum, perineum, and bladder, urethral burning, and involvement of the deeper granular structures are strong diagnostic signs. The positive diagnosis depends upon finding the gonococcus by microscopic examination.

**Treatment.** The essential object is to stamp out the gonorrhœal inflammation while yet in the vulva or vagina, and thereby to keep the infection from going to the higher zones of the genito-urinary system, where it is often fatal, always destructive. Disinfectants—*i. e.*, germicides to the extent of the patient's toleration—are indicated. The usual means of cleanliness should be increased and rigidly maintained. If the disease is in the vagina, let the vulvo-vaginal surfaces be painted, as in granular vaginitis, with solution of nitrate of silver, forty grains to the ounce. The vagina and vulva should then be packed with dry sublimated or borated gauze, which should be renewed as often as it becomes at all moist from the secretions. At each time of changing the gauze, the surfaces should be thoroughly cleansed by means of a warm 5 per cent. aqueous solution of carbolic acid; this is to be followed by a thorough washing with peroxide of hydrogen, which is very cleansing to the deeper glandular structures. The diet must be non-irritating. Urethral or bladder complication calls for diuretic drinks. Crayons of ichthyol, aristol, or dermatol in the urethra, if tolerated, may be useful.

#### Erysipelatous Vulvo-vaginitis.

Erysipelas is primarily an inflammation of the lymphatic vessels of the skin or mucous membrane. The infection is caused by a streptococcus similar to the streptococcus pyogenes, perhaps identical with it.



The disease is febrile, always acute, often suppurative and superficial, and chiefly characterized by a tendency to spread. There are three varieties: the erythematous, vesicular, and gangrenous.

The Erythematous erysipelas of the vulva and vagina is the milder form. It presents redness and heat of the surface. The skin or mucous membrane is but little swollen, and the tendency is strongly toward spontaneous recovery.

The Vesicular form is more severe, is characterized by intense inflammation of the skin or mucous membrane, by marked œdema, and by the appearance of vesicles or bullæ under the surface which, like blisters, contain serum. Further infection in these vesicles may cause suppuration. Then the inflammation may extend to the deeper structures and become phlegmonous.

The Gangrenous is the most dangerous form of erysipelatous vulvitis. It apparently results from rapid development of the streptococci and their products in the lymph channels and connective-tissue spaces so as to shut off nutrition and cause necrosis. It results in the destruction of large areas or of small patches of skin or mucous membrane.

*Phlegmon* is often associated with erysipelatous vulvitis. It involves not only the lymphatic vessels, but also the glandular elements and the deeper connective tissue. The inflammation may be diffuse or circumscribed, and may terminate by resolution or by suppuration.

Erysipelatous vulvo-vaginal inflammation occurs most frequently in very young infants by extension from the navel, or it may spread from the vulva to the thighs and nates; it is sometimes observed in childhood, but is rare in adults, except in childbed, where it is a most dangerous affection. Bad nutrition and filth are strong predisposing causes. The prognosis is ordinarily more grave in infants than in children or adults. Generally speaking, the prognosis is favorable, doubtful, or grave according to the extent and severity of the disease. Gangrene of the vulva, especially in infants, is almost always fatal.

Treatment does not differ materially from that of the diphtheritic form, see below. If the inflammation become phlegmonous and result in suppuration, the abscess should be opened. The gangrenous variety calls for rigid disinfection with pure carbolic acid and for strong supporting measures.

#### Diphtheritic Vulvo-vaginitis.

This form of vulvo-vaginal inflammation rarely occurs in the non-puerperal adult. It attacks children during epidemics, and is then usually communicated from diphtheria which has originated elsewhere. It is more commonly the local manifestation of a very grave form of puerperal fever which sometimes occurs in epidemics, especially in the obstetric wards of hospitals.

There are other forms of the membranous vulvo-vaginitis in which the germ of diphtheria is not present.

Treatment. The general treatment includes energetic supporting measures, such as quinine, the mineral acids, tincture of chloride of iron, and sometimes heart stimulants. The bowels should be kept

regulated, if necessary, by mercurials and salines. The local treatment is the same as in the general therapeutics of vulvo-vaginitis: antitoxin and other measures are indicated as for diphtheria elsewhere.

#### Tubercular Vulvo-vaginitis.

Tubercular inflammation has been found in every portion of the genital tract, the order of frequency for the various portions being the Fallopian tubes, corpus uteri, ovaries, vagina, cervix uteri, and vulva. It gives no characteristic symptoms; the diagnosis depends upon finding the bacillus tuberculosis. The disease is usually secondary to tuberculosis in some extra pelvic organ, although it may be primary in the genitals. It is probable, though not certain, that tubercular infection may be the result of coitus.<sup>1</sup> Tubercular vulvo-vaginitis is rare.

The Treatment of tubercular vulvo-vaginitis is the same as that of tubercular disease elsewhere—*i. e.*, systemic and local. Proper climate, out-of-door life, careful attention to nutrition, thorough strong cauterization and, if necessary, removal of the affected parts, are indicated. See Lupus Vulvæ, Chapter XXV.

#### Mycotic Vulvitis and Vaginitis.

This form of infection is most common in diabetic subjects; certain fungi—mycoses—chief among them the leptothrix and leptomitus, are often found in the vulvar secretions, and are doubtless the exciting cause of this form of vulvitis. There are continual itching and burning. The pruritus is extreme. The hypersecretion, sleeplessness, pain, and loss of appetite are most depressing, and may hasten the result of the diabetes. The vulva throughout has a coppery-red color, is much swollen, dry in some parts, moist in others. Scratching may cause here and there considerable bleeding. The skin is dry and brittle, wrinkled and rigid. The affection usually invades the folds of the groin, the mons veneris, the folds of the nates, and may surround the anus. An improvement in the general condition of the patient may lessen the local disease. It usually returns, however, and with increased severity.<sup>2</sup>

Diabetic urine apparently favors the development of the fungi, although the disease is not always associated with sugar in the urine. Furunculosis often complicates diabetic vulvitis.

Vulvo-vaginitis and vaginitis, not only in diabetic but also in non-diabetic women, have been observed in connection with certain fungi—leptothrix<sup>3</sup> and *oidium albicans*.<sup>4</sup>

**Etiology.** Catarrh of the genital tract and pregnancy are predisposing causes. The micro-organism may be brought in contact with the genitals by intercourse, especially with a diabetic man. The fungus may be carried on the finger of the gynecologist. Winckel cites two cases in which the infection apparently was traced to touching the genitals by the hand dusted with flour.

<sup>1</sup> J. Whitridge Williams. Johns Hopkins Hospital Reports, iii, pp. 85-152.

<sup>2</sup> F. Winckel. Diseases of Women, p. 60.

<sup>3</sup> Haussmann. Die Parasiten der weibl. Geschlechtsorgane. Berlin, 1870, Winckel.

<sup>4</sup> Winckel.

**Symptoms, Diagnosis, and Prognosis.** The leptothrix causes less inconvenience than the *oidium albicans*. The latter may induce severe itching, burning, heat, and increased secretion. The swelling of the vagina may extend to the vulva, and then be so great that the patient cannot stand or walk. The epithelium is exfoliated and the urine causes pain when in contact with the exposed surfaces. The irritation may be extreme and paroxysmal.

Vulvo-vaginal mycosis usually begins with a subacute inflammation which extends throughout the vagina. In the vulva the inner surface of the nymphæ and the folds about the meatus urinarius are chiefly affected. Small yellow spots upon the reddened mucous membrane or skin, which cannot be scraped off without at the same time removing the epithelium, are characteristic of the disease. These spots, taken together with finding the micro-organism by microscopic examination, will establish the diagnosis. The prognosis is variable. The disease under treatment sometimes disappears in a few days. In pregnant women it may continue until after delivery.

**Treatment.** This often includes attention to the associated diabetes. A diabetic dietary, tonics, and mild saline laxatives are first indicated. The intolerable itching and burning necessitate local remedies, of which many have been used with varying and temporary success. Wash thoroughly with a tepid solution of corrosive sublimate, 1 to 2000, or with a saturated solution of boric acid. Benzoated oxide of zinc ointment, or an ointment of vaseline and salicylic acid, 1 to 200, is useful. The sitz-bath, temperature 80° F., prolonged for an hour, often gives relief; to this bath may be added a pound of Indian meal. Astringent washes of tannin or alum, or sulphate of zinc, may be indicated.

Since the skin in mycotic vulvitis is already dry and brittle, it is not well to dust the vulva with powder. To relieve the suffering, which is usually worse at night, place a compress moistened with a 3 per cent. solution of carbolic acid on the parts before going to bed. Anodynes may be used locally; one part of chloroform to five parts almond oil, ointments of belladonna and morphine, or a 6 per cent. solution or ointment of cocaine may give temporary relief. The disease in a diabetic subject is usually intractable or incurable. See *Furuncular Vulvitis* and *Pruritus Vulvæ*.

Mycoses of the vulva and vagina in subjects not suffering from diabetes are usually self-limited or easily cured by the treatment above indicated. The vaginal mycoses require douches of carbolic acid, 3 per cent., or of corrosive sublimate solution, 1 in 2000. The mycoses of pregnancy are usually limited to that state.

#### Syphilitic Vulvo-vaginitis and Chancroid.

The subject includes the primary, secondary, and tertiary forms of syphilis.

Chancre develops not until after an incubation of from ten to twenty days, usually the latter. It is first a reddened excoriated spot or a hardened papule with or without ulceration. Its characteristic feature is induration. The induration may be parchment-like and



superficial, or it may be deep and reach laterally far beyond the edge of the erosion or ulceration. The indurated tissue is hard, like cartilage. In the ulcerative form the ulcer is usually small and funnel-shaped, with sloping edges, superficial or deep; the edges are never undermined. The bottom of the ulcer is gray, the discharge sero-purulent and never free. Rarely more than one chancre ever appears in the same person. The inguinal glands usually enlarge, but do not suppurate. Chancre is only the local sign of syphilis, and its pus is rarely, if ever, auto-inoculable.

Chancroid, which is a purely local infection, has no period of incubation, is auto-inoculable, has a rounded or oval margin, abrupt or ragged edges, no induration, and may develop into a large or phagedenic ulcer. The inguinal glands are prone to suppurate. Large numbers of chancroids may occur on the same person.

The secondary and tertiary lesions of syphilis include mucous patches and gummata. Their presence upon the genitals in no respect modifies their general character or treatment.

Treatment. The treatment is that of syphilis or, as the case may be, chancroid. The local lesions may be complicated with other forms of vulvo-vaginitis, which should have special attention according to their class. The treatment of the syphilitic lesions in the genitals is the same as when they occur elsewhere.

### Superficial Vulvitis and Vaginitis.

This is sometimes called simple inflammation. When acute it often produces mild systemic fever and sometimes excessive swelling, pain, and irritation. The disorder is erythematous and resembles urticaria. It does not give rise to much exudate, is not very virulent, and seldom or never extends to the follicular or glandular elements or to the uterus. It tends to rapid resolution on removal of the irritating cause. Excessive œdema of the labia minora, which it often causes, may disappear in a few hours.

The causes are often largely mechanical, such as masturbation, excessive coitus, rubbing, scratching, presence of pinworms or the parasites of the *tœnia circinata*. Irritating vaginal or uterine discharges, urine through a vesico-vaginal fistula, and cancerous ichor are among the chemical causes. The inflammation may be in the form of vulvitis, vulvo-vaginitis, or vaginitis. It does not involve the corium in the vulva nor the submucosa in the vagina. The mildness of the affection is due to the lesser virulence of the exciting cause or to its superficial location, or to both. The treatment has already been described in the general therapeutics of vulvo-vaginal inflammation. See page 155.

### Senile Vulvo-vaginitis.

Senile vulvo-vaginitis is usually, though not always, a somewhat deep inflammation. The retrogressive physiological processes of the menopause which result in senile atrophy of the reproductive organs destroy, for the most part, the epithelial portion of the mucous membrane of



the uterus and vagina. It has also the same effect upon the muco-cutaneous covering of the vulva. The lining of the uterus, vagina, and vulva is now composed largely of fibrous tissue. This fibrous tissue when inflamed is prone to granulate, to suppurate, to cicatrize, to contract, and to form adhesion of any surfaces in contact with one another. Stenosis at the internal or external os uteri may prevent free drainage of the uterine secretions. These secretions, already pathological, become excessively irritating by partial retention. Similar secretions also come from the vagina and vulva. Aged women, therefore, who have long ago passed the menopause are subject to a most irritating vulvovaginitis—a most exhausting and distressing pruritus vulvæ. The adhesions often entirely envelop the vaginal portion of the cervix and may partially obliterate the vagina. The vulvar glands and mucous crypts, especially in pruritus cases, are extensively involved. Their removal is the only means of relief from the intolerable itching and burning. See Treatment of Glandular Vulvitis, page 163. In other respects the treatment is the same as that already laid down in the general therapeutics, page 155.

#### Glandular Vulvitis.

**Inflammation of the Urethral Crypts.** Five or six small racemose glands are situated around the meatus. They have short ducts with wide openings; two of them are in little depressions on either side of the meatus. Inflammation in these glands or crypts, not uncommon during and after the menopause, may cause a most persistent pruritus with extreme itching and burning; this occurs most frequently in connection with senile vulvitis.

FIGURE 100.



Enlargement of the vulvo-vaginal gland by cyst or abscess.<sup>1</sup>

Inflammation in these glands or crypts, not uncommon during and after the menopause, may cause a most persistent pruritus with extreme itching and burning; this occurs most frequently in connection with senile vulvitis.

**Inflammation of the Vulvo-vaginal Glands.** The vulvo-vaginal glands of Bartholin are on either side of the vaginal orifice near the posterior extremity of the bulb of the vagina. Their ducts are about one-half inch long and open into the fossa navicularis.

Inflammation of these glands comes by extension from the external surface. The glands, or their afferent ducts, or both, may be involved. A suppurating gland may pour out pus through its duct; or the duct may close by adhesive inflammation and form an abscess;

<sup>1</sup> From Thomas and Mundé. Diseases of Women.

or the occlusion of the duct may result in the distention of the duct with the normal secretion of the gland. This would be a retention-cyst. One or both glands may be affected. The disease is very common.

**Diagnosis.** Abscess is distinguished from the retention-cyst of the glands by the presence of acute pain and heat in the former and their absence in the latter. Enlargement of the gland from either of these two conditions is distinguished from phlegmonous vulvitis by the location of the former, which corresponds to that of the gland, while phlegmon may be anywhere in the vulva; and from vulvar hernia by the absence of the characteristic signs of hernia.

Glandular vulvitis once established is prone to become chronic. The glands serve as a culture-ground for the infecting bacteria, and superficial vulvo-vaginitis, though apparently cured, may again and again recur from the infected glands. The vulva through its glandular structures is a great distributing point of pelvic infection. The periodical congestion of menstruation is a recognized predisposing cause of recurring pelvic inflammation. The capacity of glandular structures to receive, retain, and distribute infection will often explain the frequently observed attacks of recurrent gonorrhœa in women.

An explanation of latent gonorrhœa in the male, discussed by Noeggerath, may be the same as that made in the preceding paragraph for recurrent gonorrhœa in women.

**The Treatment of Glandular Vulvitis**, when acute and non-suppurative, is palliation and cleanliness, the latter to be secured chiefly by disinfectants. When the inflammation is chronic the treatment varies with the different glands, as follows:

The five or six small mucous crypts near the meatus urinarius, when infected, are the seat of an intolerable pruritus. To cure this destroy the glands by the actual cautery or by excision. The author's preference is to excise them, close the wounds by suture, and let them unite by first intention.

The treatment of an abscess of a vulvo-vaginal gland is the same as for abscess following phlegmonous inflammation; it should be widely opened, the wound packed with gauze, and made to heal from the bottom by granulation. In opening the abscess find the gland, if possible, and remove it.

When a retention-cyst has formed from occlusion of the duct the sac should be dissected out, the wound sutured and drained with a small rubber tube or with gauze. If drainage is not used, the wound usually suppurates.<sup>1</sup> Sometimes chronic suppuration of the gland occurs through the open duct. Then the duct should be widely incised, the gland removed, and the wound packed with gauze or sutured, and drained as above described.

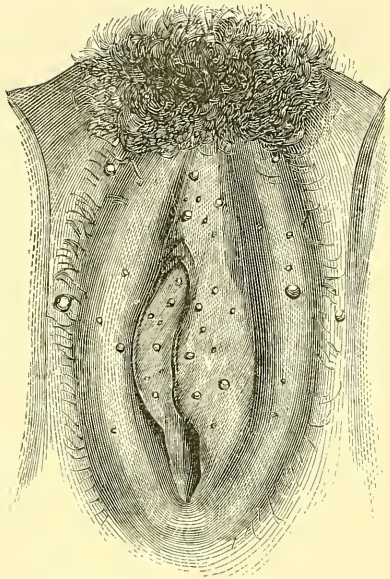
### Follicular Vulvitis.

The labia minora and majora are abundantly supplied with hair-bulbs, sebaceous follicles, and sweat-follicles. Inflammation in these

<sup>1</sup> The author published this operation in the Chicago Medical Review in 1880.

structures is follicular vulvitis or folliculitis. The general appearance of the surface is unchanged, except slight congestion. The inflamed

FIGURE 101.

Follicular vulvitis.<sup>1</sup>

openings of the follicles scattered over the labia minora and majora are small, red, elevated, and swollen. Children are not subject to folliculitis. The inflammation may originate in the follicles or may extend to them from the external surface, as in glandular vulvitis. The infection often remains entrenched in the follicles long after it has disappeared from the external surface, and from these lurking-places may again and again reinfect the surface.

Adhesive inflammation may close the openings of the ducts, when the secretions will be retained and form small abscesses as large as a pea; otherwise the discharge is abundant, purulent, and often offensive.

**The Treatment of Follicular Vulvitis.** The disease may be so deeply seated that it resists all surface applications and yields only to direct deep cauterization, strong

enough to destroy the secreting structures. For this purpose use the fine galvano-cautery needle or the point of a probe made red-hot in the flame of a spirit-lamp.

In follicular vulvitis with occlusion open each follicle with a small, sharp-pointed knife, and then apply the fine-pointed conical solid stick of nitrate of silver. This may be done under cocaine without pain.

#### Furuncular Vulvitis.

Furunculosis usually starts in the hair-follicles and extends to the surrounding cellular tissue. The resultant boil may be developed at numerous points in the labia majora, where the disease is mostly confined. Some women have an unexplained tendency to this form of vulvitis. Furunculosis is common with diabetes. The author has observed that glycerin tamponade is apparently an exciting cause of boils. The incipient boil may often be aborted by pulling out the hair from the inflamed hair-bulb, thereby giving drainage.

The Treatment of furunculosis is the same in the vulva as elsewhere—*i. e.*, open and drain the abscess. Numerous boils sometimes follow one another, or occur in successive clusters in one locality. Such recurring infection is usually due to the presence of the microbes of suppuration which remain on the surface ready to produce reinfection

<sup>1</sup> From Thomas and Mundé.



at any favorable point. Daily cleansing of the surface and thorough disinfection with the ointment of biniodide of mercury (1-60) for two weeks after the last boil has disappeared are effective means of prophylaxis.

#### Emphysematous Vaginitis.

This rare disease occurs mostly in pregnancy. It is characterized by numerous small, soft cysts of variable size just under the vaginal surface. These cysts contain serous fluid and gas. The affection is usually associated with other forms of vaginitis. The diagnosis may be verified by pricking the cysts; then the gas escapes with a blowing sound. In pregnant women the cysts disappear without treatment at the end of pregnancy.

Treatment. In puerperal cases the treatment is expectant. In non-puerperal cases, if the cysts do not disappear under antiseptic douches, they should be opened and the vagina packed with antiseptic gauze.

#### Paravaginitis.

Paravaginitis, sometimes called dissecting vaginitis, is a rare disease which involves the submucous connective tissues. Burrowing abscesses are formed with perivaginal fluctuations. The musculature of the vagina and vulva, in whole or in part, may separate and slough off in a gangrenous mass. The cicatricial contraction which follows will then cause stenosis or atresia. It is often impossible in such cases to restore the calibre of the vagina or vulva by operative measures. Secretions of blood or menstrual fluid may accumulate above the atresia in the vagina, uterus, or Fallopian tubes. This disease is usually due to a grave infection by the streptococcus or by the germ of diphtheria.

Treatment. The pus should be freely evacuated as soon as it is discovered. If sinuses form they should be incised and drained. Plastic operations and dilatation may be required to overcome cicatricial contraction and possible atresia. Atresia from this cause is not to be confused with the congenital atresia described in the chapter on Malformations.

## CHAPTER XII.

ECZEMA VULVÆ, HERPES VULVÆ, KRAUROSIS VULVÆ, PRURITUS VULVÆ, HYPERÆSTHESIA VULVÆ, VAGINISMUS.

AMONG the disorders allied to vulvo-vaginal inflammation are eczema vulvæ, herpes vulvæ, kraurosis vulvæ, pruritus vulvæ, and vaginismus.

#### Eczema Vulvæ.

This is an infrequent disease, mostly confined to pregnancy. It may be acute or chronic. The eruption consists of nodules, vesicles,



pustules, and scabs, with variable redness, swelling, and moisture of the skin. The vesicles contain serous fluid. Pus is found under the scabs in the more severe cases. The skin and sometimes the subcutaneous tissue are infiltrated. Acute eczema may remain local and terminate within two weeks. Chronic eczema, often intractable, may extend to the *mons veneris*, thighs, and nates, with swelling and supuration.

**Treatment.** The general treatment consists of mercurials and salines, non-irritating diet, avoidance of wine and liquor, and hygienic living. The local treatment varies with the condition. Whenever the subcutaneous structures are exposed, the solid nitrate of silver point should be applied, care being taken to touch only the exposed surfaces. Oftentimes numerous very minute abrasions may be seen with the unaided eye or through a magnifying glass. These should be delicately touched with the finest point of nitrate of silver. The application should be repeated every five days until the abrasion disappears. The following ointment is useful :

Ointment of rose-water . . . . .	1 ounce.
Lanolin . . . . .	2 drachms.
Oxide of zinc . . . . .	1 drachm.
Boric acid . . . . .	1 "
Ammoniated ichthyol . . . . .	30 grains.
Thymol . . . . .	5 "

The parts should be kept clean and dry. Dusting with bismuth often gives relief.

#### Herpes Vulvæ.

Herpetic eruption, not unlike herpes labialis, is occasionally observed upon the vulvar labia. There is little redness or swelling. The disease is usually self-limited; like herpes in other places, it runs its course in a few days and disappears.

#### Kraurosis Vulvæ.

Kraurosis vulvæ as the name indicates, is a shrinking of the vulva; its literature dates only from 1875.<sup>1</sup> The disease is characterized by atrophy of the cutaneous covering of the vulva, especially of the inner surface of the nymphæ. The skin appears dry and shrunken. The surface has the tense, glistening appearance of scar tissue, and the disease differs from eczema in its atrophic processes. The affection causes distressing paroxysms of itching and burning pain in the diseased part. Sometimes the vulvar orifice is extremely contracted. The clinical features are so characteristic that once recognized they will never be mistaken for those of any other disease. The hair around the vulva is thin and dry, and late in the disease almost entirely absent. The vulva appears small and infantile, the labia minora are shrunken and, finally, almost absent; the skin is pale, without pigment, but studded with numerous irregularly-shaped reddish-brown blood spots, which on inspection appear slightly depressed below the

<sup>1</sup> Robert F. Weir: Ichthyosis of the Tongue and Vulva, *New York Medical Journal*, March, 1875. Breisky: Kraurosis Vulvæ, *Centralblatt für Gynäkologie*, 1885, p. 358. Lawson Tait: Diseases of Women, Lea Bros. & Co., 1889, p. 53. C. A. Reed: *Trans. American Association Obstetrics and Gynecologists*, 1894. Howard Longyear: *Ibid.*, 1895.

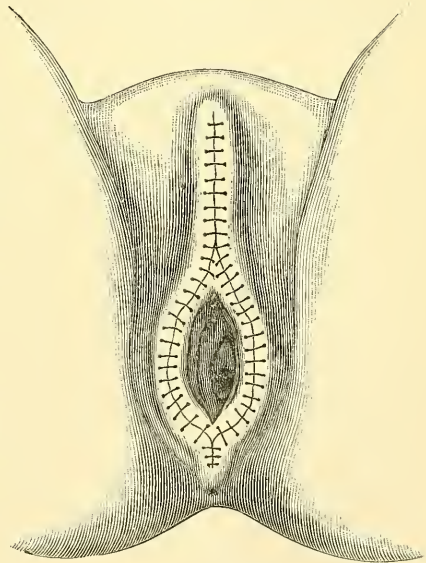
surface. These spots are confined entirely to the vestibule, but disappear in the later stages of the disease. The skin is dry, sometimes cracked, abraded, and occasionally gives forth a slight, brown, purulent discharge. The natural elasticity of the vulva is entirely lost. The orifice is so contracted as usually to prohibit the introduction of the speculum. The sensitiveness of the parts is very great, especially, while the brown spots are present. This, together with the tenseness of the vulvar orifice, causes extreme dyspareunia; in fact, usually prohibits coition.<sup>1</sup>

The Pathology is not fully known. In addition to the foregoing pathological changes, may be mentioned a thickening of the layer of epidermis, decrease in the number of sebaceous glands, and sclerosis of the connective tissue. The tightly contracted skin is so stretched over the parts that even the pressure of the examining finger may make deep rents.

Longyear has observed a deep cirrhotic-like band of fibrous tissues entirely separate from the cutaneous covering. He regards this band as the essential lesion, and gives to the superficial changes a secondary importance. This fibrous band replaces the loose cellular tissue through which the nutrient vessels pass to the skin, and by its gradual and continual contraction causes not only the vulvar shrinkage, but also the strangulation of the bloodvessels which pass to and from the overlying cutaneous structures. The disturbance in circulation explains the spots of ecchymosis already mentioned in the earlier stages of the disease and the atrophic changes in the later stage. The pain is explained by mechanical pressure on the nerves and by the resultant neuritis and perineuritis.

**Treatment.** This new formation of fibrous tissue is of special interest from the surgical standpoint. Clearly the removal of this band, together with the contracted superficial structures, is essential to the cure of the disease. The usual operation of removing the degenerated and contracted muco-cutaneous structures may relieve the acute symptoms, but can have no effect on the stenosis. Spontaneous recovery is sometimes reported, but this is only a relief from the supersensi-

FIGURE 102.



Lines of union made by Longyear's operation for kraurosis vulvæ.<sup>2</sup>

<sup>1</sup> Adapted from Longyear. American Obstetrical Journal, 1895, p. 824.

<sup>2</sup> From Bonnet and Pettit. *Traité Pratique de Gynécologie.*

tiveness of the vulva, never from the constriction. The fibrous band, unless removed by operation, is permanent. Longyear's operation is analogous to the Whitehead operation for hemorrhoids. It consists of the removal of all the superficial diseased structures, together with the fibrous band beneath, and union of the external and internal margins of the wound. An incision with scissors is first made along the lateral and posterior margins of the vulvar orifice dividing the diseased structures from the healthy skin; then the margin of the diseased tissue, including the fibrous band, is seized with dressing-forceps and dissected loose from the underlying tissues to the vaginal inlet. This tissue is then cut away. The anterior vulvar structures are dissected loose in the same manner, care being taken to cut carefully round the urethral orifice. After removing all the diseased structures in this way, the margin of the healthy vaginal wall above is pulled down and dissected loose from the underlying parts around the whole circumference of the vagina. This loosening of the vaginal wall permits the inner margin of the wound to be brought down to the outer margin. The two margins are then united with deep silkworm-gut and superficial catgut sutures, or with fine buried formaldehyde catgut. Complete relief has followed the operation.

#### Pruritus Vulvæ.

In neuropathic cases of vulvar inflammation the irritation, itching, and burning are intense, intolerable, intractable, and thereby constitute a condition called pruritus vulvæ. Because the nervous element often predominates, the disease has been classed as a nervous affection. Pruritus is, however, rather a symptom than a disease. It may arise from a variety of causes; may extend over the adjacent mucous surfaces, and is often aggravated by efforts to get relief by scratching; in this way the habit of masturbation is sometimes formed. The intense suffering causes loss of sleep, exhaustion, and sometimes alarming nervous depression. Sexual excitement and orgasms may occur. Pruritus may be complicated by melancholia, hysteroneuroses, and other forms of insanity. These psychoses may or may not be dependent on the disease. In many cases a paroxysmal wave recurs with great violence upon exercise or upon getting into a warm bed. The nervous element has not been adequately explained; it may be a cause, or an effect, or a coincidence. Oftentimes the inflammatory element is insignificant or apparently absent.

The Pathology of pruritus is not fully known. It is considered by some authorities to be of purely nervous origin, by others, who follow the lead of modern etiological theories, as of bacterial origin. The truth lies between the two extremes. There may undoubtedly be an irritation of the sensory nerves of the vulva, skin of purely neuropathic origin; when this irritation occurs it is usually aggravated by the presence of more or less vulvitis. The tangible pathology is largely, therefore, the same as already described under vulvitis.

Etiology. It follows from the above that the causes of pruritus will include those of vulvitis. Numerous attempts to explain the



causation of pruritus have sometimes made up in scientific elaboration what they have lacked in clinical value.<sup>1</sup>

The following classes of causes are worthy of consideration :

1. Circulatory causes.
2. Secretory causes.
3. Parasitic causes.
4. Mechanical causes.
5. Thermic causes.

1. *Circulatory causes.* In certain disorders, such as icterus, chronic nephritis, diabetes, the blood contains bile, urea, or sugar, which may, by their action on the nerve-endings, cause itching of the parts. Morphine, alcohol, and iodoform sometimes have a similar action.

Erythema, herpes, urticaria, and other such skin disorders which involve stasis hyperæmia may occur in the region of the pudendal and hemorrhoidal veins; they are then characterized by the intense pruritus which they cause.

2. *Secretory causes.* Abnormal secretions of the vulvar cutaneous glands, vagina, or uterus may, especially if combined with the above-mentioned causes, produce great irritation in the terminal sensory nerves of the vulva. Secretions from the diseased bowel or anus may by chemical action produce pruritus ani and, by extension, give rise to pruritus vulvæ.

3. *Parasitic causes.* Animal parasites, such as pediculi and ascarides, and vegetable parasites, such as leptothrix, oidium, and leptomitus, and the ordinary bacteria of inflammation have already been presented under Vulvo-vaginitis. The vegetable parasites give rise to a skin disease sometimes called prurigo.

4. *Mechanical causes* include masturbation, immoderate handling, and scratching.

5. *Thermic causes.* Heat and cold are known to cause a peculiar pruritus, called in winter pruritus hyemalis and in summer pruritus æstivalis.

Above all these causes another and more essential element must be taken into the account; it is what Goodell once called the invisible, intangible, and imponderable influence of the nervous system; it is the difficulty, not to say the impossibility, of reckoning with this element that often makes the disorder persistent or intractable. The most that can be affirmed in our present limited knowledge is that there is an irritation of the sensory nerve organ of the skin, and that many causes may contribute to its excessive development. Whatever the tangible lesion may be, nervous irritability and hyperæsthesia are always essential elements.

Intolerable itching of the anus is a frequently recognized accompaniment of habitual constipation, and is often associated with pruritus vulvæ. This may be explained by the fact that the vulva is innervated by the same nerves that supply the anus. The intestinal leucomaines which have been recognized as a cause of pruritus ani may therefore also cause pruritus vulvæ.

<sup>1</sup> A most elaborate and scientific discussion of the etiology of pruritus was contributed by Sænger. Centralblatt für Gynäkologie, 1894, No. 7.



**Symptoms and Course.** The irritation is apt to be in paroxysmal waves. The paroxysms may recur after vigorous exercise, especially in warm weather, before or after menstruation or upon exposure to artificial heat. In some cases they appear upon getting into a warm bed. The desire to rub or scratch for the relief of the irritation is almost irresistible. This instinctive effort at counter-irritation greatly aggravates the pruritus. As Thomas aptly remarks, "the disease and the remedy which instinct suggests react upon one another, the first requiring the second, and the second aggravating the first until a most rebellious and deplorable condition is developed, the patient, bereft of sleep by night and tormented constantly by day, finally gives way to despondency and depression." The loss of sleep, the use and abuse of anodynes, and the neurosis incident to the disease may even contribute to the development of melancholia or some other form of insanity.

The pruritus may extend to the vagina, anus, thighs, and abdomen. In some cases the irritation begins in the anus.

**Diagnosis and Prognosis.** Pruritus is not a disease, but a symptom; diagnosis must therefore depend upon the identification of the causative lesion. In so far as the disease depends upon tangible and visible conditions the diagnosis and prognosis will follow along the lines already laid down in the foregoing pages, on vulvitis. A clear appreciation of the special etiology of the disorder as above given will in a majority of cases open the way to accurate diagnosis.

Without great care the examination may fail to disclose the point and source of irritation. An irritating discharge, for example, so slight as to be unknown or ignored by the patient, may be sufficient to produce the most distressing irritation, and may therefore have the utmost significance.

In the vast majority of cases the presence of one or more of the following conditions will be found, and will partially or wholly explain the irritation :

Vulvitis ;	Ichorous discharge from cancer ;
Vaginitis ;	Incontinence of urine ;
Endometritis ;	Pathological urine ;
Urethritis ;	Intestinal disease ;
Urethral caruncle ;	Vulvar eruptions ;
Parasites ;	Onanism.

Most commonly associated with pruritus are vulvitis, vaginitis, and endometritis. The fact that these diseases do not commonly produce the disorder is explained by the absence of the essential neurosis. Senile vulvo-vaginitis is most prone to cause excessive irritation, and when due to this cause the pruritus is most obstinate.

The pruritus of pregnancy and the menopause is commonly limited to those states. In general the prognosis is indeterminate.

**Treatment.** The treatment of vulvo-vaginitis already laid down is necessarily a part of the treatment of pruritus vulvæ.

A multiplicity of diverse remedies recommended in the therapy of any disorder may be taken as evidence that our resources are limited or that the disorder may result from one or more of a wide variety of

different pathological conditions. Both of the above propositions are true of pruritus vulvæ.

It is clear that the treatment must be directed to the cause of the irritation; to this end the reader is referred to the therapy of vulvovaginitis and of the numerous diseases and disorders already mentioned under Etiology and Diagnosis.

In many cases the irritation is apparently the outcome of pent-up sexual energy. It is a common observation that a woman who suffers intensely and in whom the neurotic element is specially marked has entire relief upon the return of her husband from a prolonged absence.

While the radical treatment is in progress, palliative measures are always demanded for the immediate relief of the urgent symptoms. Fortunately, most of the palliative measures, since they allay irritation, are in a degree curative. In order to remove irritating discharges Sitz-baths and vaginal douches of clear water or antiseptic solutions are indicated.

The following local applications may give relief:

The surfaces after each bath may be dried and freely dusted with calomel, bismuth, starch, or lycopodium powder. The calomel is generally preferred.

A vaginal tampon of gauze will often protect the vulva from the discharge, and thereby give temporary relief. The tampon may to advantage be saturated with a solution of acetate of lead in glycerin, one drachm to the ounce.

Great relief is sometimes experienced from a gauze compress over the vulva saturated with the dilute solution of subacetate of lead and laudanum, equal parts. The compress should be frequently changed.

A compress saturated with a solution of corrosive sublimate, 1 to 1000, is, perhaps, the most effective single remedy. This application or some form of mercurial inunction will act as if by magic when the cause is parasitic.

Cloths wrung out in very hot water and applied to the vulva, just before going to bed, may relieve or prevent the paroxysm which comes on after retiring.

A strong infusion of tobacco,<sup>1</sup> both as a vaginal douche and on the vulvar compress, is said to be most efficacious.

Ointments are useful from the soothing effect of their constituents and because they protect the parts from contact with irritating discharges. They are also an excellent vehicle for the application of parasiticides.

In rare cases the pruritus is due to a growth of short, stiff, inverted hair on the labia majora or pubes. This condition is called *trichiasis*. Prompt and permanent relief follows the removal of the hairs and the destruction of their bulbs by electrolysis.

The treatment of the disorder, if due to the diabetic, uric acid, or other diathesis, must include the appropriate dietetic and other hygienic measures.

One case in which the neurotic element prevailed<sup>2</sup> has been reported

<sup>1</sup> Thomas and Mundé. Diseases of Women.

<sup>2</sup> Thomas, in Thomas and Mundé. Diseases of Women.

in which prompt and complete relief followed the smoking of tobacco.

Painting the vulva with pure ichthyol has been known to effect a radical cure. In one case observed by the writer an application of pure carbolic acid, made by mistake, was followed by permanent cure.

Highly seasoned and highly nitrogenous food and stimulating beverages aggravate the irritation, and should be avoided. For the same reason scratching and rubbing of the part is injurious.

Finally, there is danger of forming the habit of using cocaine, morphine, or other narcotics; for this reason their use should be guarded with judgment.

When apparent causes have received due attention, and the disease has resisted all treatment, operative interference may become necessary.

Sänger's conclusions on this point are based upon experience, and deserve attention. He says :

(1) The partial or total extirpation of the vulva is a legitimate operation that should often be performed in chronic, otherwise incurable *pruritus vulvæ*. He calls it *vulvitis pruriginosa*.

(2) The removal also of the glans clitoridis, especially in elderly women, is permissible. Its nerve terminations have usually lost their specific sensibility by reason of the disease.

(3) In younger individuals, if the irritation is circumscribed, one may try to give relief by a partial operation without removal of the clitoris.

(4) In elderly women, when the disorder is extensive, the whole vulva should be extirpated and the parts repaired by a corresponding plastic operation. See *Surgical Treatment of Kraurosis Vulvæ*, page 167.

#### Hyperæsthesia of the Vulva.

Thomas<sup>1</sup> has described, under this name, a rare disorder of the vulva which occurs in hysterical and despondent women at or near the menopause. It consists of an excessive sensibility of the nerves supplying the mucous membrane of some part or all of the vulva.

The slightest friction excites intolerable pain and nervousness; even a cold and unexpected current of air produces discomfort, and the least pressure is intolerable. Sexual intercourse is often impossible.

The disease is sometimes associated with vulvitis or a painful urethral caruncle; in other cases no tangible or visible cause can be found. It differs from pruritus by the absence of itching, and from vaginismus in not causing spasmodic contraction of the vagina.

The Treatment is unsatisfactory. Even the complete destruction of the mucous membrane of the sensitive area with caustics, or its excision, has failed to give relief. Sexual intercourse should be prohibited and the patient sent to a place of hygienic surroundings and cheerful company. The general treatment is by tonics, sea-bathing or warm-water bathing, and massage. Local lesions, if present, are treated according to their special indications.

<sup>1</sup> Thomas and Mundé. *Diseases of Women*. Adapted from Garrigues' *Diseases of Women*.



## Vaginismus.

Like pruritus vulvæ, this rare condition is not a disease, but a nervous symptom due in some cases to appreciable, in others to unknown causes. It is characterized by spasmodic contractions of the muscles surrounding the vulva and lower portion of the vagina. The condition is analogous to laryngismus. The spasms occur upon attempted coitus or upon the attempt to make a digital or speculum examination. The writer has observed one strongly neurotic case in which the woman declared that the spasm occurred violently whenever coitus was attempted, but not the slightest objection was made to digital or speculum examination.

**Etiology and Clinical Course.** The condition is mostly confined to young neurotic hysterical women. The palpable or visible lesion is usually in the form of an irritable hymen or an irritable caruncle of the meatus urinarius. If the hymen has been ruptured the irritation will be in its remains, the carunculæ myrtiformes. These caruncles and the urethral caruncle in some cases contain a superabundance of excessively sensitive and large nerve-filaments. They, in fact, may resemble neuromata. In other cases the sensitive caruncles are absent, and the vaginismus is characterized only by an excessively sensitive vaginal outlet, which may or may not be the seat of inflammation or erosion. Repeated attempts at coitus against an unyielding intact hymen may give rise to vulvitis and extreme tenderness—a condition which should not be confounded with vaginismus.

There may be no appreciable cause of the disorder save a progressively increasing nervous apprehension on the part of the wife; each attempt gives rise to greater nervous excitement until the pain and fear of coitus and the extreme spasmodic contraction of the levator ani and neighboring muscles which form the sphincter vaginæ preclude the possibility of a successful effort. Thomas has given to this distressing symptom the elegant name "dyspareunia." "Penis captivus" has been known to result from an otherwise successful coitus.<sup>1</sup>

**Treatment.** Any discoverable local cause should be removed. A vulvar tampon of gauze saturated with a 4 per cent. solution of cocaine kept in place ten minutes before the attempt may lead to successful coitus, and therefore to utero-gestation and parturition. Maternity in most cases, though not in all, effects a cure.

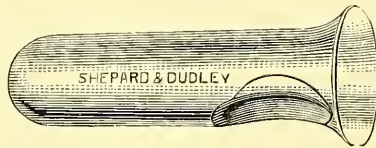
Vulvar inflammation and erosion require the treatment described under Vulvo-vaginitis. Excision of the irritable caruncles and gradual or forcible dilatation of the vagina have in many cases given relief. The mere division of a rigid or imperforate hymen may be sufficient to remove the obstacle. Gradual dilatation is made by the introduction of graduated rectal bougies, to be worn an hour or more daily. Forcible dilatation requires ether, and should be followed by the continued wearing of a Sims vaginal plug. Meantime the patient remains in bed until the divulsed vaginal walls have healed. The plug should be removed only during urination, defecation, and the giving of the vaginal douche; after healing it may be daily introduced

<sup>1</sup> Hildebrand, of Koenigsberg. Thomas and Mundé, Diseases of Women.



by the patient in order to retain the effects of the divulsion. In obstinate cases divulsion will be inadequate. It is sometimes necessary to incise deeply at several points or to make two quite deep lateral incisions on either side near the posterior vulvar commissure. These incisions should completely divide the underlying muscles and their fascia; they may be closed by lines of union running at right angles to the directions in which they were made, or until healing is established they may be kept open, as already described, by means of the vaginal plug.

FIGURE 103.



Sims' glass vaginal plug.

Sims has advised coitus under anæsthesia for severe cases. Large doses of morphine, or local anæsthesia by means of cocaine, would perhaps serve a better purpose.

## CHAPTER XIII.

### INFLAMMATION OF THE UTERUS.

#### General Considerations.

THIS chapter should be read in connection with Chapter X., on the General Principles of Infection and Inflammation of the Pelvic Organs.

Inflammation, broadly defined as the reaction which living tissue exhibits to morbid irritation, may include a wide variety of lesions. These lesions, as related to the uterus, have been variously and sometimes vaguely designated as chronic metritis, subacute metritis, subinflammatory states, irritative states, and congestive states. This broad definition, however, is not intended to include neoplasms, although the division between these and inflammatory formations may at certain points be arbitrary.

**Anatomy and Physiology.** The study of metritis is the study of the anatomy and physiology of the uterus as modified by inflammation. A review of such parts of the anatomy and physiology as will aid in a description of these inflammatory processes will be useful.

The interior of the uterus is divided into two cavities, the cavity of the corpus and the cavity of the cervix. The former is protected from injurious influences from above by the two muscular constrictions which divide it from the Fallopian tubes, from below by a similar arrangement at the internal os. The cavity of the cervix is in a like manner pro-

tected from infection from above by the internal os, from below by the external os.

The *Uterine Wall* is made up of three layers: the mucous layer, called the endometrium; the muscular layer, called the myometrium; and the peritoneal layer, sometimes called the perimetrium.

The *Endometrium* is composed of lymphatics, bloodvessels, nerves, glands, and connective tissue, and is covered by a single layer of ciliated columnar epithelium. This epithelium also lines the uterine glands and is continued through the Fallopian tubes. The same variety of epithelium, modified, also lines the cavity of the cervix. Pavement epithelium covers the external vaginal portion of the cervix; it takes the pavement form at the external os.

The *Glands of the Corpus Uteri* are tubular, narrow, branching depressions. They dip down into and through the endometrium and penetrate to the muscularis. These tubular glands, penetrating everywhere throughout the endometrium, take up a very large part of its volume. They all open into the uterine cavity, sometimes two by a single orifice.

FIGURE 101.

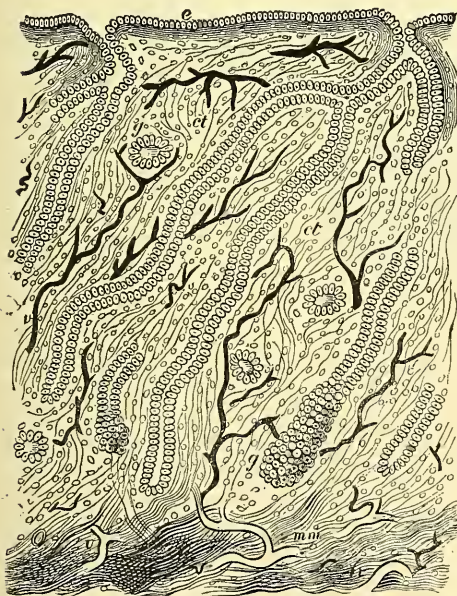
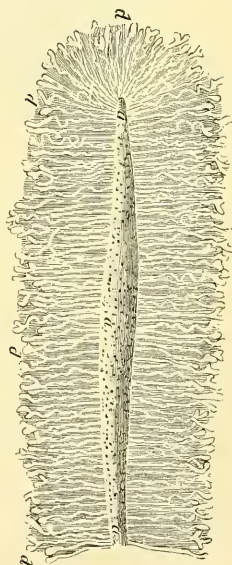


Figure 104.—Vertical section through uterine mucous membrane; *e*, columnar epithelium; *g*, uterine glands; *ct*, connective tissue surrounding glands; *vv*, bloodvessels; *nm*, submucous tissue; The glands are shown in both longitudinal and transverse section.<sup>1</sup>

Figure 105.—Longitudinal section of endometrium, showing uterine glands at beginning of pregnancy. Twice the natural size. *d,d,d,d*, distal extremities of glands; *a,a,a*, uterine cavity.<sup>2</sup>

FIGURE 105.



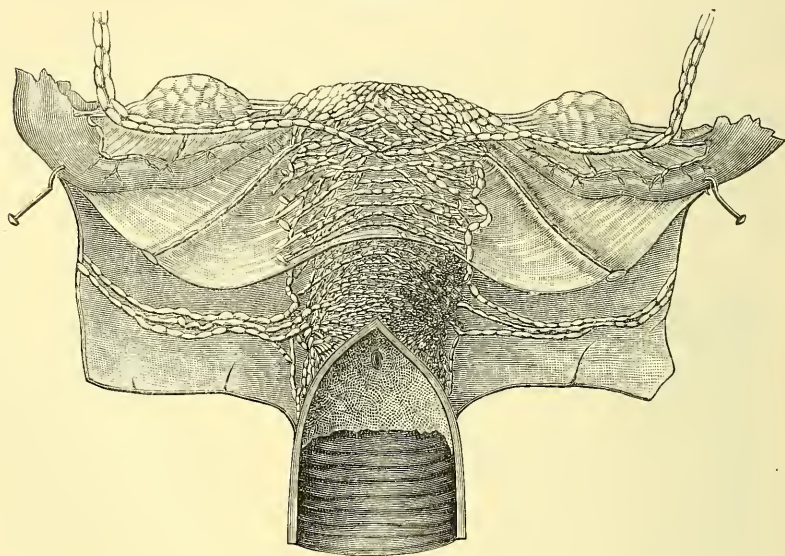
The corporeal endometrium is bound firmly to the inner layer of the muscularis by connective tissue which is continuous with that of the myometrium.

<sup>1</sup> Turner: from American System of Gynecology.

<sup>2</sup> Ibid.

The *Lymph Spaces and Lymph Vessels* of the uterus are abundant in the endometrium, in the muscular strata, and in the serosa. They lie in the interglandular spaces, surround the muscular bundles, communicate with a fine lace-like network in the uterine serosa, and then, converging, pass by large channels outward through the broad ligaments. See Figure 106. The uterus is richly supplied with nerves, both spinal and sympathetic. The arteries and veins are described in the chapter on myomata.

FIGURE 106.

Lymphatics of the uterus.<sup>1</sup>

The minute anatomy of the cervix differs from that of the corpus uteri in the following particulars. Its mucous surface has a peculiar arbor vitæ appearance, as shown in Figure 107. The cervical mucosa, like the corporeal, is lined with a single layer of ciliated columnar epithelial cells. These cells, modified to the shape of a cup, pass without cilia into the cervical glands. The epithelial cells are shorter, and the connective-tissue cells are closer together in the cervical than in the corporeal mucosa. The cervical mucosa, more dense than the corporeal, is bound less firmly to the muscularis by looser connective tissue; it does not participate in menstruation. An important function of the cervix is that of a sphincter to separate the corpus uteri from the vagina. The normal secretion of the uterine glands is alkaline, that of the corpus clear and watery, that of the cervix clear and viscid. A milky secretion is evidence of disease.

The essential function of the corporeal mucosa is the formation of the decidua and the nourishing of the embryo. The connective-tissue

<sup>1</sup> After Poirier, in Pozzi's Treatise on Gynecology.



cells produce the cells of the decidua of pregnancy; this, with the progress of utero-gestation, matures, becomes over-ripe, degenerates, and being of no further use at term is cast off.

The most significant factor in metritis is the endometrium. It presents in the developmental and atrophic changes of puberty and the menopause, in the vascular changes of the menstrual ebb and flow, widely and constantly varying states. Inflammation of the uterus may occur during infancy, before the endometrium has matured; during puberty, when it is maturing; during maturity, when it has reached its full physiological significance; during the menopause, when it is undergoing degeneration; or during senility, when in the physiological sense, it has forever disappeared. The occurrence of metritis under such diverse

conditions partly explains the wide and variable range of its phenomena, the difficulty of description, and partly accounts for the confusion of classification and nomenclature which runs through the literature.

#### Classification.

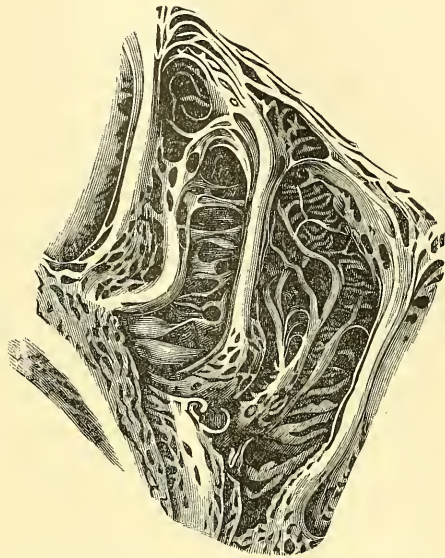
The general subject, classification of infection and inflammation, has been discussed in Chapter X. The current classifications of metritis are numerous and faulty.

The **Etiological Classification** is based upon predisposing causes, such as parturition or traumatism, and upon the bacterial causes. The difficulty in identifying the causes and in differentiating between the many causes of a given case detracts from the value of the etiological classification as a clinical guide.

A bacteriological classification may, under conditions of more exact knowledge, ultimately become a practical diagnostic, prognostic, and therapeutic guide. Already indications point strongly in this direction. Unfortunately, such a scientific working guide, except to a limited degree, must be deferred to the future.

The **Pathological Classification**, so-called, into catarrhal, suppurative, granular, and ulcerative metritis is rather a designation of certain phases of the inflammatory process than a classification.

FIGURE 107.



Arbor vite arrangement of the cervical mucosa, magnified.<sup>1</sup>

<sup>1</sup> Mann. A System of Gynecology. From Playfair.



The Anatomical Classification includes endometritis; corporeal, cervical, parenchymatous, and glandular metritis; parametritis and perimetritis. If these varieties usually occurred as distinct circumscribed lesions instead of complicating one another; if each could be known by its own peculiar symptom group; if ordinarily one could be clinically separated from the other, the anatomical classification would not be as it is, impractical and misleading. Endometritis, for example, cannot long continue without involvement of the myometrium, and *vice versa*. In either form there will be congestion and consequent increased secretion through the glands, and the glandular structures will also be involved. General metritis includes the peritoneal covering of the uterus. There are no sharp clinical or pathological lines of demarcation between the anatomical divisions of uterine and peri-uterine infection.

To illustrate the absurdity of the attempted classifications of metritis, observe the following from an otherwise excellent modern treatise. This work classifies metritis into (1) acute inflammatory, (2) hemorrhagic, (3) catarrhal, (4) chronic, painful. In the first division the word inflammatory is tautological. Any of the so-called varieties may be hemorrhagic, catarrhal, or painful. It is possible, therefore, to retain of this classification but two words—acute and chronic. The following paragraphs go still further to show that any elaborate attempt at definite classification, even though diagrammatically attractive, is clinically impossible.

#### Nomenclature.

The nomenclature of the foregoing paragraphs, although not the outgrowth of adequate classification, is yet useful as a means of naming certain forms and phases of metritis. Such words as gonorrhœal, parenchymatous, and catarrhal are convenient for purposes of description. The name endometritis, for example, will be used to describe not a distinct lesion independent of the rest of the uterus, but rather an essential part of uterine infection. In this way we shall not lose sight of the clinical relations between the various forms and phases of metritis.

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## CHAPTER XIV.

### ACUTE METRITIS.

WHEN infection reaches the uterus it usually attacks first the mucosa. It then may extend to the myometrium and peritoneum. Metritis is therefore a combination of endometritis, myometritis, and perimetritis. The storm-centre of the infection is the endometrium and its essential factor endometritis. It is impossible to preserve the autonomy of either one of these three factors of metritis, or to draw definite lines of division

between them. The terms endometritis, myometritis, and perimetritis will be used not to describe separate and distinct lesions, but rather to identify the morbid changes that may occur in definite parts of an infected uterus.

### Etiology.

The etiology has been outlined in the chapter on the General Principle of Pelvic Inflammations.

The Predisposing Causes include those influences that produce uterine congestion, such as menstruation, suppression of the menses, displacements, constriction of the uterine canal and consequent obstruction to the free outflow of secretions and menstrual fluid, excessive venery, menstrual congestion, taking cold during menstruation, hot and cold douches during menstruation, the so-called diatheses, among them lithæmia, cholæmia, anæmia, gout, and rheumatism, the abuse of pessaries; but, above all, parturition, abortions, and traumatism. These conditions and others like them were formerly supposed to be the essential causes. Now it is known that they contribute to the production of metritis as predisposing causes when supplemented by some other influence. This influence is the exciting cause. It is usually produced from without, seldom produced within.

**Exciting Causes.** Among the exciting causes numerous bacteria and their products predominate. Their significance has been partially discussed in the General Principles of Inflammation, Chapter X., and in the Etiology of Vulvo-vaginitis. They usually invade the cavity of the cervix uteri from below, intrench themselves in the cervical glands, and thence may be distributed directly by continuity of surface to the corporeal endometrium, the Fallopian tubes, ovaries, and pelvic peritoneum, or they may pass directly by the lymphatic or venous circulation from the cervix, vagina, rectum, or bladder to the ovaries and peritoneum. From these organs they may descend by continuity of the mucosa through the tubes to the endometrium.

The cavities of the cervix and corpus uteri, especially the latter, are normally free from pathogenic bacteria. The bacteria may, however, easily find access, and, once there, will be active or inactive according to the presence or absence of predisposing causes; that is, according to the degree of resistance which the tissues exhibit to their presence. The corporeal and cervical mucosa, penetrated throughout with a great abundance of tubular glands, are especially adapted to incubate and distribute bacteria. This accounts for the tendency of metric and perimetric infection to become chronic.

The gonococcus of Neisser, since it has great power to penetrate the glandular elements and to intrench itself therein, is one of the most frequent and destructive causes of metritis. The staphylococci of suppuration are commonly found also in suppurative endometritis. The streptococcus pyogenes, generally admitted to be the germ of erysipelas, is very infectious and very fatal. A streptococcus infection does not usually spread by continuity of the mucosa, but may rapidly follow the lymphatics and veins to the muscular and peritoneal layers, Fallopian tubes, parametria, and ovaries. It is often the infectious

germ in the graver forms of puerperal and traumatic pelvic inflammation. Its great danger lies in the fact that it does not strongly attract leucocytes, and therefore does not excite defensive action. The diphtheritic and tubercular bacilli, the bacillus coli communis, and other bacteria may also be the exciting causes of metritis. The infection is often introduced from want of cleanliness during the puerperal state, from imperfect asepsis in parturition, in treatment, or in surgical operations. Direct infection through coition is very common.

During the three or four days after parturition and just before menstruation the physiological congestion of the uterus renders it most susceptible to infection. The cervical portion at all times is apt to be the habitat of pathogenic germs; such germs are often introduced by the physician's finger, or upon septic instruments, of which the unclean uterine sound is a striking example. The infectious material may be inactive, unless the soil is prepared to receive and develop it; but when the traumatism of abortion and parturition, of accident and of surgery, have opened wide the door for bacterial invasion, infection will be the natural result.

#### Pathology.

The lymph channels bring into direct and close communication with one another the endometrium, myometrium, parametric cellular tissue, Fallopian tubes, peritoneum, and ovaries. The uterine mucosa now becomes both the starting point and the distributing point of the infection. The infected endometrium may readily and abundantly pour its poisonous products through the lymph stream, with resultant lymphangitis, myometritis, cellulitis, salpingitis, peritonitis, and ovaritis. Very significant is the fact that the lymph spaces have no walls except the cellular tissue around them. This exposure of the cellular tissue may explain the great susceptibility to infection of the uterine, parametric, and peri-uterine connective tissue. Infection may also be carried by the veins to all parts of the uterus and its surroundings in the same manner as by the lymph channels.

The disease may spread from the endometrium not only by the vessels, but also by continuity of mucosa to the Fallopian tubes, peritoneum, and ovaries, or may descend from these organs to the endometrium.

The swift and terrible march of the traumatic and puerperal infections to a destructive or even fatal result is partially explained by the close physiological and anatomical relations of the lymph stream to the endometrium and uterine peritoneum. See Figure 106. The irritants, usually streptococci or other pus cocci and their products, are taken up by the lymphatics or veins and widely distributed. The vessels may serve only as carriers of the irritant, or it may infect them and produce lymphangitis, lymphadenitis, or phlebitis. The inflammation may be so intense as to destroy the vessels, or resolution may bring about complete recovery. Inflammation in the lymphatics or veins may result in lymph thrombosis or venous thrombosis. This is nature's way of limiting the spread of the infection. When recovery takes place the lymph or blood stream is re-established around the obstructed parts of these vessels by collateral circulation. Peri-



lymphangitis and periphlebitis may occur in the cellular tissue around the thrombosed lymphatics and veins. This process, when it takes place in the parametria, is pelvic cellulitis, a disease almost forgotten in these days of tubal and ovarian pathology. See Pelvic Cellulitis.

The anatomical changes may be summarized as follows :

Infiltration of the interglandular and intermuscular connective tissue with small, round cells.

Engorgement of the lymph spaces, lymph vessels, and bloodvessels.

Extravasation of blood in limited spaces.

Swelling of the entire organ, with pain.

Swelling and redness of the inflamed endometrium.

Excessive secretion of the uterine glands.

The milder cases, chiefly characterized by engorgement, increased secretion, and pain, may subside in a few days, and the uterus may become normal or may lapse into a state of chronic metritis. In the more severe forms the disease may run a destructive course to the death or permanent disability of the patient. Its extent will vary with the virulence of the exciting cause and the resistance of the inflamed structures. Abscesses rarely develop in the myometrium except in connection with myoma. Inflammation of the mucosa may be catarrhal, suppurative, ulcerative, hemorrhagic, or all combined.

A grave form of acute disease has been described under the name diphtheritic or dissecting metritis.<sup>1</sup> The infection is usually puerperal, but is sometimes a sequel of non-*puerperal* diphtheria. It may be associated with gangrene of the vulva, and may occur after scarlet fever, typhoid fever, or cholera. In *puerperal* cases, says Garrigues, the diphtheritic infiltration may extend from the endometrium to the neighborhood of the peritoneum, cutting off a large part of the muscular layer, which after weeks or months will be expelled as a pear-shaped body. Dissecting metritis may be connected with a similar disease of the vulva and vagina.

The ultimate changes in the uterine glands, uterine connective tissue and muscularis, and in the peritoneal covering of the uterus, are discussed elsewhere. See Chronic Endometritis, Myometritis, and Peritonitis.

### Symptomatology.

The symptoms of acute metritis depend upon the extent and gravity of the disease, and therefore may vary within wide limits from those of a mild infection to those of the greatest virulence. An apparently mild metritis may, however, result in the most destructive pelvic infection with all the results of grave peritonitis. The onset is usually marked by a chill, followed by variable high temperature and pulse; the pain is often intense. There is usually tenesmus of the rectum and bladder. Menstruation, if present, may suddenly cease, or the flow may increase. The menstrual fluid is mixed with the secretions of the inflamed glands. The congestion often passes off as menorrhagia comes on. This is nature's way of relieving the engorged vessels.

<sup>1</sup> Garrigues. Dissecting Metritis, *New York Medical Journal*, 1882, vol. xxxvi. p. 537; *Diseases of Women*.



The discharge, especially in the gonorrhœal form, may rapidly become purulent. When the inflamed uterus contracts to expel its abundant secretions the agony is that of exaggerated labor-pains. The bearing-down and heat in the pelvis are often excessive. When the disease has extended to the Fallopian tubes, pelvic connective tissue, ovaries, and especially when it invades the peritoneum, there will often be grave ptomaine poisoning, with anxious facies, increased vomiting, and tympanites. Unless such infection is cut short by surgical measures the result may be rapidly fatal. The mode of death is usually by ptomaine poisoning. See Perilymphangitis and Periphlebitis.

#### Diagnosis and Prognosis.

The diagnosis is based upon the changes just described. Digital touch usually causes great pain, and may require anæsthesia. The corpus uteri is large and soft. The cervix is swollen, the os usually patulous, and often surrounded by erosion. The vagina is hot, and the arteries strongly pulsating. The urgent necessity is to watch for tubal and peritoneal extension. See Diagnosis of Salpingitis and Pelvic Peritonitis.

The prognosis of acute metritis is always disquieting, often grave. The disease may terminate in rapid resolution or in chronic metritis. Extension to the peritoneum involves immediate danger to life or remote danger to health. The relative virulence of different microbes has been discussed in the paragraphs on Etiology, page 179. Puerperal metritis is most liable to spread with the lymph-stream, and is, especially when due to the streptococcus pyogenes, the gravest form.

#### Treatment.

The treatment is prophylactic, abortive, palliative, expectant, and surgical.

Prophylaxis includes the avoidance or removal of the predisposing and exciting causes. Reference to the etiology, page 179, will suggest the appropriate indications. The susceptibility is greater during the puerperal state, parturition, abortion, the puerperium, and menstruation. Extra care, therefore, at such times is essential. Especially forbid undue exposure of all kinds. Avoid the bacterial exciting causes by asepsis. Aseptic midwifery is imperative. The minor gynecological and obstetric examinations and manipulations without asepsis are dangerous. After an aseptic curettage, trachelorrhaphy, perineorrhaphy, or any other operation on the vaginal side of the pelvic floor, apply one large or two small ice-bags over the hypogastrium. The bag must be in contact with the skin. Its utility is destroyed by the intermediate towel or napkin. In order to take up any water which might condense on the surface of the bag and run over the patient, surround the sides and top of the bag with absorbent cotton. To hold the ice in place when the patient is on the side, let it be secured by a wide abdominal bandage. Above all, use every means to prevent the spread of a vulvovaginitis, especially if it be gonorrhœal, to the uterus. See Treatment of Vulvo-vaginitis.

The Abortive Treatment is applicable only in the onset, and includes such antiphlogistic measures as may cut short the attack during the stage of congestion. If the metritis be associated with menstruation or with the suppression of that function, or with repeated chills, or with great prostration, use the hot-water bag in place of the ice. The old flaxseed poultice is unclean, ineffective, and unless renewed very often does not hold the heat. A large blister over the hypogastrium may substitute or supplement the ice. Leeches are of great value if promptly and thoroughly applied. Use five or more over each inguinal region and five to the perineum—two or three are useless. A most essential thing is early and active catharsis by a mercurial purge, two grains of calomel or five of blue mass, repeated if necessary and followed by Rochelle salts or some other saline. The administration of quinine in full doses and opium has been followed by good results, but their value is questionable. The greatest medical reliance is in the mercurial and saline purge, leeches, and ice. The disease once established must run its course. The treatment is palliative and expectant in the milder cases, but may have to be energetic in the more virulent. In case of metritis following a plastic gynecological operation the sutures should be immediately removed and the denuded surfaces cauterized with pure carbolic acid.

The Palliative Treatment includes rest in bed, anodynes, especially the opiates, the hot or warm water vaginal douche—page 81—the hot-water bag, and the hot hip-pack. When the acute stage is subsiding there may be use for the glycerin and wool vaginal tamponade, page 82. Later, iodine counter-irritation to the hypogastrium and vaginal fornix. Deep scarification through the speculum relieves the engorged vessels and may abort or palliate the attack. Let the cervix be pierced rather freely at several points by means of a fine-pointed bistoury or Buttle's spear-pointed lance. The oozing may be prolonged by tepid water or stopped by the hot-water douche, or, in a very vascular case, by the tampon. Should pain be intolerable, use a suppository of aqueous extract of opium, one grain, and extract of belladonna, one-sixth of a grain.

Expectant Treatment. The milder self-limited infections which have no grave systemic or local manifestations may be dismissed with palliative or expectant treatment. In grave infections it may be extremely difficult or impossible to choose wisely between the danger of the disease and the extra peril of surgical interference; hence, even in serious cases, the expectant course may have to be considered.

Surgical Treatment. When the systemic condition is grave and the nervous system indicates profound ptomaine poisoning, the disease under any treatment will in a large proportion of cases terminate fatally. A number of practical and momentous questions at once arise:

Question 1. Is there simple absorption into the circulation from some focus of decomposition in the uterus? Is the toxæmia due to the products of a decomposing foreign body, such as a blood clot, a fragment of placenta, retained membrane, or pent-up lochia? In other words, is it due to the absorbed products of putrefactive bacteria? To put the question in a more concise form, Is it sapræmia? If the answer be in

the affirmative, the indication is clear and imperative to remove the putrefying mass, wash out the endometrium, and establish drainage. The offending mass may be removed with the finger, the placental forceps, or, if necessary, with the dull curette. Sharp curettage, powerful cauterization, and all other severe surgical measures in this connection are unnecessary, dangerous, and forbidden.

Question 2. Is the uterine mucosa the seat of an infection, and as such is it the distributing point of bacteria which may spread and infect the uterine appendages and peritoneum? If the bacterial invasion has extended beyond the uterus, to what extent are the uterine appendages and peritoneum invaded? Is the systemic disturbance such as to suggest that the bacteria and their products are very liable to enter the general circulation in quantities sufficient to give rise to pronounced septicæmia?

Question 3. Have pus emboli been carried through the circulation from one focus of suppuration to set up other foci in different parts of the body, and thereby produce metastatic abscesses? To put the question in another form, Is there or is there likely to be pyæmia?

If the answers to the second and third queries are in the affirmative, it becomes essential to decide whether the infection has spread so far beyond the uterus as to make the metritis relatively insignificant. Clearly, if there are metastatic abscesses or if even infection has spread to the other pelvic organs, surgical treatment of the intra-uterine infection alone would be useless and might add to the danger. Abdominal or vaginal section and the drainage of the abscesses or even the removal of the uterus and its appendages would then have to be considered.

The milder cases, as already stated, may be safely left to palliative and expectant treatment. The graver infections unfortunately have in the majority of cases passed beyond the range of intra-uterine therapeutics before the question of operative interference is forced upon the surgeon. We may, however, be concerned with the question, What surgical measures, if any, are justifiable in the effort to prevent the further spread of dangerous acute uterine infection which is still nearly or quite confined to the uterus?

The method of dilatation, curettage, and drainage of the endometrium has now to be considered. In this consideration let us not lose sight of the purpose of these procedures; it is to cut short the uterine infection and to prevent its extension, or, if already in a degree extended, to limit its force by withdrawing the toxic supply. Partial, inefficient curettage, which opens up and exposes fresh lymphatics and veins, but does not remove all the infected mucosa, will prepare the way for further infection, which may be more virulent and more sweeping than the first; as tersely stated by De Lee, it is like raking over a patch of lawn after scattering seed over it—a veritable insemination. It is evident, therefore, that curettage, if indicated at all, should be thorough; should, indeed, stop at nothing short of the removal of the entire infected mucosa. The sharp curette, which has generally been considered a more dangerous instrument than the dull one, is in reality less dangerous. The operations reported by Pryor, Krug, and others, indeed prove that the sharp curette in careful hands is much less



dangerous than has been supposed. Its thorough application in properly selected cases, according to reliable report, has been followed by prompt decrease in the ptomaine poisoning and in the other grave symptoms. The opponents of the operation declare, however, that most of the recoveries would have occurred without it, and that many of the failures have occurred in consequence of it.

If the infected endometrium has become soft, spongy, friable, and macerated, and if it is decided that its thorough removal will lessen the danger of the extension of the infection, the steps of the operation will be as follows:

1. Anæsthesia.
2. Preparation of the vagina and external genitalia as directed for minor operations in Chapter II.
3. Dilatation of the uterus, unless it is already sufficiently open.
4. Removal of the infected endometrium by means of the sharp curette; see Curettage, Chapter V.
5. Thorough irrigation of the endometrium with hot, sterilized water.
6. Thorough mopping out of the endometrium with cotton wound on dressing forceps, and dipped in a saturated solution of iodine crystals with pure carbolic acid.
7. An aseptic dressing over the vulva.

Some operators omit the iodine and carbolic-acid applications and rely upon the thoroughness of the curettage to remove all infectious matter. An advantage, however, in the use of this powerful disinfectant lies in the fact that it insures thorough disinfection of any infected shreds which may have escaped the curette, and that by its cauterizing effect it so shuts the mouths of the freshly opened lymph-vessels and bloodvessels that further absorption through them is less likely to occur.

It is the custom of many excellent operators to tampon the endometrium lightly with a continuous strip of antiseptic gauze, and to fill the vagina with another strip somewhat wider; after twenty-four hours they remove the gauze, repeat the intra-uterine irrigation, and introduce fresh gauze. Anæsthesia is not now usually required. Before the removal of the gauze it is well to make a thorough intra-uterine application of creolin or of a 25 per cent. solution of ichthyolate of ammonium in glycerin. It is a mistake to saturate the gauze with such medicinal substances, because they interfere with its chief function—capillary drainage. Iodoform and sublimated gauze have caused dangerous poisoning, and are therefore not preferred. If the grave symptoms have subsided the gauze may be removed at the end of twenty-four hours and need not be renewed. In very infectious cases some operators renew the gauze and irrigate with dioxide of hydrogen daily until the uterine secretions become normal. See Treatment of Chronic Endometritis, Chapter XVII., for a further discussion of intra-uterine curettage and drainage.

The operation above given is less dangerous and more rational than the meddlesome half-way measures of intra-uterine medication and irrigation of the undilated septic uterus. The judicious selection of



cases is manifestly a matter of great difficulty. If proper selection can be made, the operation in careful hands may be permissible and useful.

In puerperal infections, especially in streptococcus infections, the toxins are apt to be specially deficient in their power to attract leucocytes; that is, to build up a limiting wall around the infected centre and thereby to protect the general system against invasion. For this reason the puerperal infections, especially if of the streptococcus variety, are said to offer a relatively strong indication for early interference. But the streptococcus germ may reach the uterus in an hour; in two or three hours more it may have passed far beyond the uterus, where the curette cannot reach, much less remove it.

Future bacteriological researches may open the way for an etiological classification which will furnish a safe and definite guide to the therapeutic indications. Work in this direction thus far, however, gives little promise of immediate practical results. In this connection we may add that serum therapy is undeveloped, and therefore, in a practical sense, is not yet very pertinent to the subject.

The writer's personal conviction on the value of dilatation, curettage, and drainage of the endometrium in acute infection is that the measure should be limited in its application. Let no man be lured to the performance of this dangerous operation in an acute case because of the ease, safety, and efficacy of the same procedure in chronic endometritis. The only cases in which it should be performed are those which will otherwise result in dangerous spreading of the infection.

Clearly curettage is contraindicated in the numerous and grave cases in which the infection has passed to the parametria, not from the endometrium, but by the lymph-vessels or bloodvessels.

All admit the practical difficulty, not to say impossibility, of selection so as to limit the operation to those infections which are really dangerous, and still confined to the uterus. It is, moreover, a practical question whether the course of grave puerperal, gonorrhœal, or traumatic infection is often arrested by the procedure. At the same time few will deny that the operation has repeatedly given rise to fatal results. On the other hand, expectancy and palliation will often be rewarded by the subsidence of grave symptoms and final recovery.

There can be for a surgeon no greater cause of regret than the fact that he has exhausted the resisting forces of his patient by a dangerous half-way measure which itself may have contributed to the necessity for a more radical operation, and that, while on the promise of such a measure he has been lulling himself into a sense of false security, the infection has gained irresistible force. If urgent indications arise the best hope of recovery may be in abdominal or vaginal section and drainage, or the removal of the infected uterus together with its appendages. These operations, if indicated at all, are made necessary by the rapid spread of the infective process and therefore become at once imperative. Until the necessity for such extreme measures becomes apparent, there is at least virtue in the attitude of watchful expectancy. See Vaginal Incision and Drainage, in Chapter XXIII.

## CHAPTER XV.

## CHRONIC METRITIS.

CHRONIC metritis is usually understood to mean inflammation of the uterine muscularis, a condition more accurately described by the word myometritis. The former term is here taken in its broader literal sense, and is used to designate chronic inflammation of the uterus in general, without special reference to any particular part. Chronic metritis includes chronic endometritis, myometritis, and perimetritis. Uterine inflammation, acute or chronic, generally starts in the mucosa. The various parts of the uterus—*i. e.*, the endometrium, myometrium, perimetrium, corpus, and cervix—are never involved in sharply-cut areas of disease, although any one may be the specially affected part of the diseased organ. In this respect chronic and acute infection are alike. The endometrium, however, often furnishes the groundwork for the pathology, diagnosis, prognosis, and treatment. In some cases the infection is nearly or wholly confined to the endometrium.

Infection of the uterus as observed by the clinicians, except acute gonorrhœal and puerperal metritis, is generally chronic.

The striking phenomena of acute metritis are the active infective and inflammatory processes. The term chronic metritis stands not so much for definite processes as for certain chronic changes, more or less permanent, in the quantity and quality of the glandular elements, muscularis, bloodvessels, lymphatics, and connective tissue. These changes are usually hyperplastic, hypertrophic, or atrophic. The nature of the process or processes back of these states has been the subject of a long and unsatisfactory discussion. The causal element has been variously designated as infective, inflammatory, irritative, subinflammatory, and congestive. There is propriety in calling the condition inflammation because the essential element, infiltration of round cells, is generally present; their migration occurs more slowly, if at all, than in acute inflammation. The differences between acute and chronic inflammation are largely those of degree.

The Causes are largely identical with those of acute metritis: anæmia, gout, rheumatism, lithæmia, cholæmia, in many cases especially underlie and perpetuate the disease. The infectious element may reach the endometrium from the peritoneal cavity through the Fallopian tubes; usually, however, it is transmitted directly through the vagina. Ununited lacerations of the cervix may cause and aggravate the disorder. Utero-gestation may be associated with inflammation so plastic as to make the strongest adhesions between the placenta and the endometrium. Chronic inflammation always presupposes two conditions, a minimum of defence and a maximum of repair. See page 148.

The Pathology has many features in common with that of acute metritis, and, like it, may involve all the structures of the uterus: 1.

The epithelial and gland elements. 2. The lymph channels. 3. The connective tissue. 4. The bloodvessels. 5. The muscle cells. 6. The nerves. The chronic changes in these various parts may be the outcome of acute processes already described under acute metritis, or there may have been no clearly marked acute stage—*i. e.*, the disease, at least apparently, may have been chronic or subacute from the beginning. To avoid repetition the student is referred to the Etiology and Pathology of Acute Metritis.

The subject of chronic inflammation of the uterus will be continued on the following pages under the headings Chronic Endocervicitis, Chronic Endometritis, and Chronic Myometritis. Perimetritis, or infection of the peritoneal covering of the uterus, will be included in Peritonitis.

## CHAPTER XVI.

### CHRONIC ENDOCERVICITIS.

THE single layer of columnar epithelium, the connective tissue beneath, the lymph spaces, the lymphatics, the veins, the arteries, and the nerves which make up the cervical mucosa are subject to certain chronic changes which pass under the name chronic endocervicitis. Similar disease of the corporeal mucosa is called chronic endometritis.<sup>1</sup>

#### Etiology and Pathology.

Endocervicitis, often called cervical endometritis, is inflammation of the cervical mucosa. The predisposing systemic and local causes and the bacterial exciting causes have been pointed out in Chapter X.

It is in some respects like, in others unlike, corporeal endometritis. The disease often occurs by extension from vulvo-vaginitis. It rarely descends from the corpus. It may have been carried as a primary infection, without intermediate infection of the vulva or vagina, direct to the cervical mucosa. As in the corpus uteri, it may involve not only the mucosa, but also the submucosa and muscularis.

It is said that the normal endometrium is free from pathogenic bacteria, but that the cervical cavity usually contains them. This would explain the greater tendency of the cervix at all times, especially upon slight traumatisms, to become inflamed. The cervical glands, well adapted to receive, retain, and distribute infection, easily become a culture-ground for bacteria. Once entrenched in the gland-crypts, the germs may remain attenuated and relatively quiescent for long periods, and then may develop new cultures and spread.

The pathological sequence of a seemingly insignificant infection of

<sup>1</sup> Endocervicitis is a word of faulty derivation, but justified by convenience and usage.



the cervix uteri, especially if acute, may be either by continuity of surface to endometritis, salpingitis, peritonitis, and ovaritis, or by the pelvic lymphatics and veins to pelvic lymphangitis, phlebitis, peritonitis, and ovaritis; thus acute infection is seldom confined to the cervix, but is apt to involve the other parts of the uterus. The corpus uteri and adjacent organs are likely to be involved if the chronic cervicitis has followed an acute inflammation; less likely if it was chronic from the beginning.

Glandular enlargement and interstitial hypertrophy are the chief pathological factors. In this respect endocervicitis offers a close analogy to corporeal endometritis. The swollen mucosa, especially if the cervix be lacerated, takes the direction of least resistance, and may protrude through the os externum. The thickened everted mucous membrane may give to the cervix the appearance of great enlargement, a condition not unlike that of the prolapsed hemorrhoidal anus.

The cervix is sometimes so eroded as to suggest the name of cock's-comb granulations; this granular erosion on the external cervix gives it the appearance of ulceration, and in the older literature it is wrongly so called. Such erosion is rare, except on the lacerated cervix; the mucosa, however, is only diseased, not destroyed, as in ulceration. Non-specific ulceration of the cervix is rare, almost unknown. See Chapter on Lacerations of the Cervix Uteri.

The engorged, open cervical glands in great numbers pour out their secretion upon the vulvo-vaginal surface. The discharge, unlike that of endometritis, is thick, ropy, viscid, abundant, and gelatinous. It may only with difficulty be dislodged from its anchorage in the cervical glands. In nullipara the internal and external ora are sometimes so constricted as to cause retention of the cervical secretions and consequent dilatation of the cervical cavity. See Figures 112, 113, and 114.

Glandular enlargement occurs in two forms, the polypoid and the cystic.

The Polypoid Enlargement produces small mucous polypi, smaller, of different origin, and softer than fibrous polypi. The enlarged glands protrude upon the surface, their mouths become obliterated, the glandular tissue is œdematous from retained secretions, its base constricts, and the little mass becomes polypoid. See Polypoid Endometritis, so-called, Chapter XXVII. These polypoid growths are essentially adenomata. They correspond to the adenoids of nasal pathology. See Adenoma Uteri, Chapter XXVIII.

The Cystic Form of Glandular Enlargement, called cystic degeneration forming follicular cysts, is caused by the occlusion of the openings of the glandular canals by adhesive inflammation. The canals then become distended with retained secretions. These cysts often form both inside and outside of the lacerated cervix, seldom in the nulliparous cervix. The distended glands are of globular shape and vary from the size of a millet-seed to that of a pea. They are quite tense, and to the touch give the sensation of shot under the skin. Their contents is a viscid, white-of-egg-like secretion, sometimes mucopus, sometimes a dark, cheesy matter. These cysts, according to Emmet, are often the cause of great reflex nervous disturbance. See chapter



on Laceration of the Cervix for a more full discussion of cystic degeneration and for cervical endometritis due to laceration of the cervix.

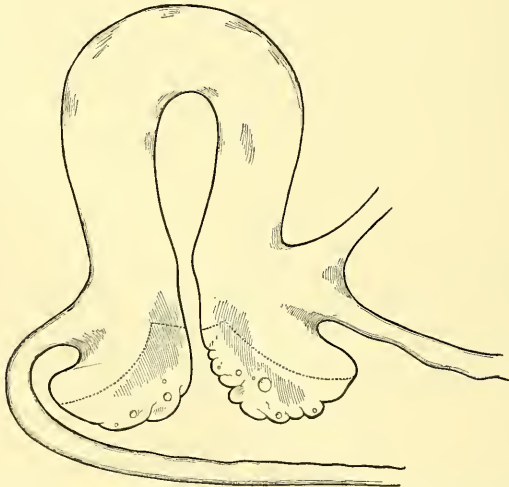
#### Diagnosis.

The diagnosis of endocervicitis is simplified by the accessibility of the diseased structures, especially when the inflamed swollen mucosa is rolled out in contact with the vagina or when the erosion extends out over the external os. Figure 108. See Laceration of the Cervix.

#### Treatment.

In the treatment of cervicitis it is well to remember the physiological fact that irritation to the opening of a duct will stimulate and increase the secretion of the gland or glands from which the duct leads, and, conversely, the withdrawal of the irritation causes a decrease in the secretion. The same is pathologically true of the uterus. Its canal is a duct leading from the uterine glands. The irritation of endocervicitis, therefore, may increase uterine secretions. It follows that whatever will allay irritation in the cervix must tend to relieve the excessive glandular activity.

FIGURE 108.



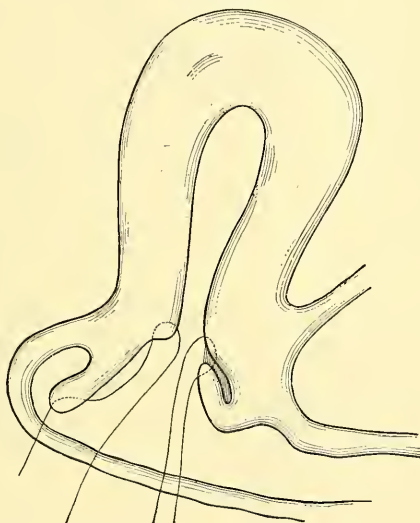
Schroeder's operation. A thickened diseased cervix requiring resection. The dotted lines show where the incisions should be made.

In acute or recent endocervicitis the treatment, especially if the infection be gonorrhœal, should be strongly disinfectant. The purpose is to prevent its spread to the corpus and parametria. First clean out the mucous plug, then thoroughly apply a saturated solution of iodine in 95 per cent. carbolic acid over the whole intra-cervical mucosa. The strong tendency of the infection to spread, and the consequent danger of carrying the disease to the corporeal endometrium by

the careless introduction of instruments past the internal os, should be kept constantly in mind.

When the disease process has penetrated to the deep mucous folds and glandular pockets, superficial treatment will always fail. It then becomes necessary to destroy the infected mucosa. Deeply-acting caustics may accomplish this, but the resulting cicatricial contraction, especially when the canal is not very patulous, contraindicates their use. The same objection in less degree applies to the removal of the mucosa by sharp curettage. Thorough excision and covering the surfaces thereby exposed by a plastic operation is usually the best treatment. The operation of Schroeder<sup>1</sup> fulfils this indication. It is performed as follows :

FIGURE 109.



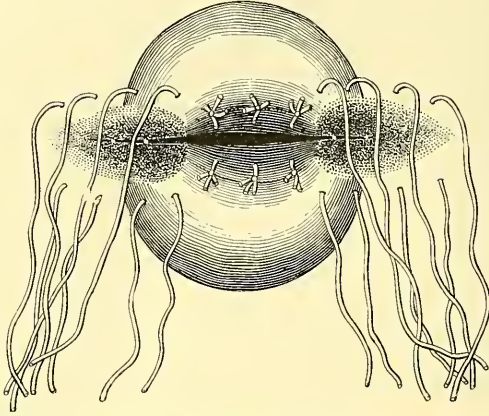
Schroeder's operation. Diseased tissues excised. Sutures in place for the union of the vaginal to the intra-uterine margins of the wound, but not yet tied.

Under ether, through Sims's speculum, the cervix is drawn toward the vulva and divided bilaterally with scissors to or beyond the utero-vaginal junction. The anterior and posterior lips are then widely separated with tenacula. The condition is now like that of extensive bilateral laceration of the cervix. The lateral incisions should be deep enough, so that when the lips are forced apart all the diseased intra-cervical mucosa may be exposed and excised. The anterior and posterior flaps are now turned in and united with sutures to the intra-cervical margins of the wound. Two or three sutures are required to secure each flap. The lateral incisions, now much shortened by the folding in of the flaps, may after suitable denudation be closed by suture, as in Emmet's operation for laceration of the cervix. Upon completion of the operation the flap sutures will be situated deep in the cervical canal, where their removal would be difficult. They should therefore be

<sup>1</sup> Handbuch der Krankheiten der weiblichen Geschlechtsorgane.

of catgut. The lateral sutures should be of silkworm-gut or fine formaldehyde catgut. If silkworm-gut, they should be removed in about two weeks. The operation, if well done, is followed by permanent cure and freedom from stenosis. Great eversion through the os externum, giving

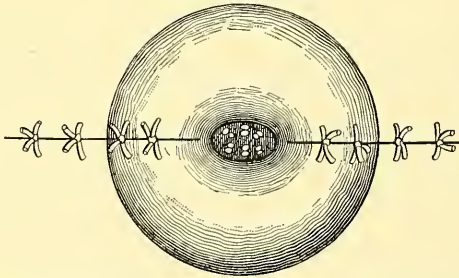
FIGURE 110.



Schroeder's operation. Vaginal margins sutured to the intra-uterine margins of the wound. Lateral surfaces denuded and sutures passed, but not yet tied.

the outrolled mucosa a hemorrhoidal appearance, is usually due to laceration of the cervix, and should be treated as such. See Emmet's Operation. Such eversion may possibly, however, occur in the virgin cervix. The soft, spongy, granular masses should then be removed with the curved scissors, the cut surfaces cauterized, and the cervix dressed with

FIGURE 111.



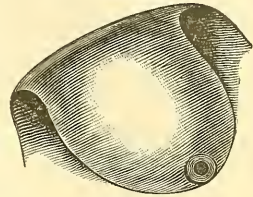
Lateral sutures introduced for the completion of the operation, and tied. The white dots in the os externum represent the protruding sutures which are now rolled far into the cervical canal.

strips of gauze saturated in a mixture of 10 per cent. ammoniated ichthyol in glycerin; the dressings to be changed daily until the surfaces have healed. This treatment will be disappointing if there be extensive endometritis above, unless that also be included in the plan of treatment. See Treatment of Endometritis. It will, however, be wholly satisfactory if the inflammation is essentially confined to the lower cervical mucosa.

Polypoid endocervicitis, so-called, requires the removal of the adenomatous growths by means of the sharp curette or the scissors. When glandular disease is extensive it may be necessary to perform Schroeder's operation. The cystic form of glandular enlargement rarely occurs in the nulliparous woman. The conditions and treatment are described under Lacerations of the Cervix. Schroeder's operation is usually indicated.

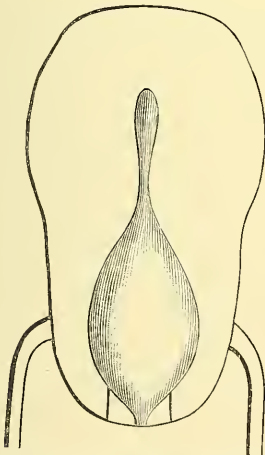
In nulliparæ the internal and external ora are sometimes so narrow that the cervical secretions are retained and distend the cervical cavity quite beyond its normal size. Sometimes the internal os is open, and the corpus is correspondingly enlarged from the same cause. These retained secretions give rise to great irritation and reflex disturbances. The rational treatment is to open the canal by free incision of the external os and, if necessary, by dilatation of internal os. An exploratory curettage will show whether the endometrium requires thorough dilatation, curettage, and cauterization. In order to prevent the external os from again closing, a

FIGURE 112.



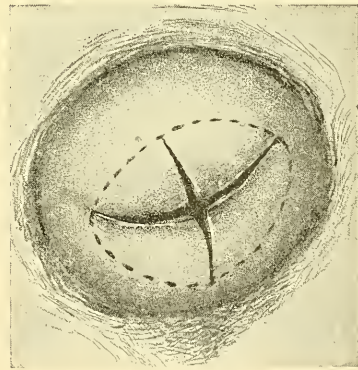
Pinhole os.<sup>1</sup>

FIGURE 113.



Canal dilated by uterine secretions from obstruction at external os. Lines on either side of os externum indicate depth of proposed incisions <sup>2</sup>

FIGURE 114.



Crucial incisions in Fritche's operation.<sup>3</sup>

plastic operation should be made to keep it open. Schroeder's operation, already described, will suffice, or the incision may be very free and kept wide open by guaze packing during the healing process. See Figures 113 and 114.

The pinhole os is usually congenital, and chiefly confined to nulliparæ. It may, however, occur as the result of caustics or of too tight

<sup>1</sup> From System of Gynecology by American Authors.  
<sup>3</sup> From Thomas and Mundé's Diseases of Women.

<sup>2</sup> Ibid.



closure in the operation for laceration of the cervix uteri. The constricted external os may be opened by Fritche's operation, as shown in Figure 114, or by forcible dilatation. After the application of either of these methods the os is liable to recontract. Schroeder's operation, which gives permanent results, is therefore preferable.

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## CHAPTER XVII.

### CHRONIC ENDOMETRITIS.

THE layer of columnar ciliated epithelium, the connective tissue, the blood and lymph vessels, and the nerves which compose the endometrium are, like the similar structures in the cervix, subject to chronic infection. Certain pathological changes result from this infection, and are the essential factors of chronic endometritis.

#### Etiology and Pathology.

The predisposing and exciting causes are the same as already described for acute metritis. The most usual source of the infection is from the cervical mucosa.

It is here important to remember that not every increased secretion is proof of endometritis. There may be an effort on the part of the mucosa to relieve a chronic venous congestion in and about the uterus by an increased secretion, or the mucous membrane of the uterus in common with that of other organs may be engaged in vicarious elimination of effete matter which the proper excretory organs have failed to eliminate; such conditions strongly predispose to and are present in a large proportion of cases of endometritis, but are not in themselves endometritis.

In studying endometritis one should also remember that the infected endometrium is often only a part of an infected uterus, and that this infection in many cases is not limited to the uterus, but in variable degree may involve the uterine appendages and parametria.

The general pathology has already been forecast under acute metritis. The special pathology will be presented in the description of the different forms.

After death the mucosa is mottled, dark, soft, swollen, and sometimes easily detached. The bloodvessels are increased in size and number. The lymph vessels are enlarged. The interglandular spaces are infiltrated. The entire uterus is usually engorged and swollen.

The possible phases of the infection may occur separately or may combine in one case; they are

*a.* Catarrhal, when the inflammatory product is simply an increased secretion of mucus.

- b. Suppurative, when the inflammatory product contains pus.
- c. Ulcerative, when there is molecular death of a part.
- d. Hemorrhagic, when the vessels have sufficiently opened by necrosis to give the secretion a distinct bloody color.

Classification.

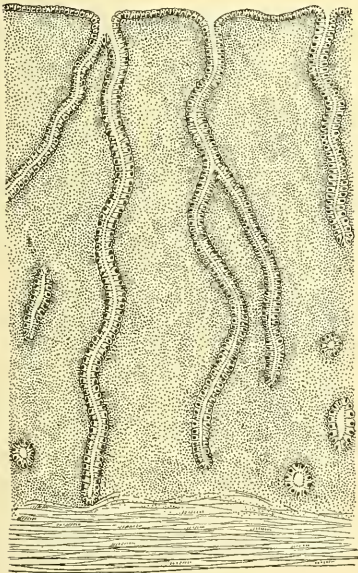
The general divisions of chronic endometritis are: 1. Histological. 2. Clinical.

HISTOLOGICAL FORMS OF ENDOMETRITIS.

Histologically there are, as in inflammation of other organs, two distinct forms: a. Parenchymatous endometritis. b. Interstitial endometritis.

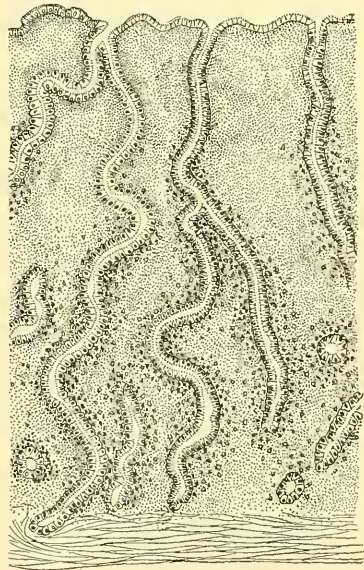
*Parenchymatous Endometritis.* This form specially involves the glandular elements, and is therefore commonly called *glandular endometritis*. The epithelial cells increase, and thereby enlarge the glands, but do not necessarily increase their number. These hypertrophic changes have led to the frequent designation of this form as *hypertrophic endometritis*.

FIGURE 115.



Glands of the normal uterine mucosa. Semi-diagrammatic.

FIGURE 116.



Mucosa as modified by glandular endometritis; glands enlarged and more tortuous. Round-cell infiltration. Semi-diagrammatic.

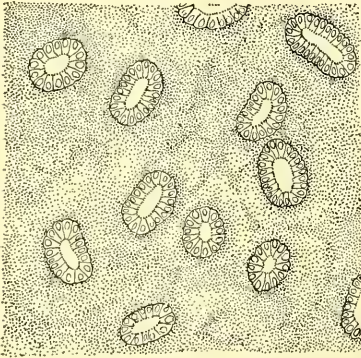
There is another condition in which the glands are increased both in size and in number. This is sometimes called *hyperplastic endometritis*. It has been said to occupy a somewhat intermediate position between inflammatory and neoplastic growths. It is really adenoma,

and the associated endometritis is an incidental factor. A further description of adenoma may be found in Chapter XXVIII., on Tumors of the Uterus.

In both hypertrophic and so-called hyperplastic endometritis the glands, normally straight or nearly straight, become tortuous, grow longer, and sometimes decidedly penetrate the muscularis.

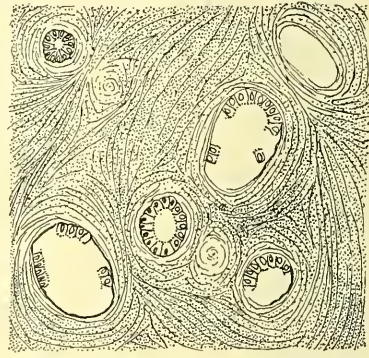
*Interstitial Endometritis* is characterized by an atrophic process and by the conversion of the interglandular connective tissue into a hard, fibrous substance like cicatricial tissue. The effect of this contracting fibrous tissue is to shut off the nutrition of the glands and thereby to crush out and destroy them. Such glands as are not obliterated may be changed to retention cysts. The mucous membrane in parts or throughout, if the destructive process has been complete, undergoes atrophic changes as in senile atrophy, and becomes a thin layer of cicatrix-like tissue, finally covered with something not unlike pavement epithelium. This atrophic process may be associated with and may follow hypertrophic glandular endometritis. Its result in cicatricial development is similar to that produced by the destructive action of chloride of zinc or other strong caustics. The condition is cirrhotic.

FIGURE 117.



Glands of normal mucosa. Transverse section.  
Semi-diagrammatic.

FIGURE 118.



Mucosa modified by interstitial endometritis. Connective tissue increased. Glands crushed out or changed to retention cysts. Semi-diagrammatic.

Polypoid endometritis, so-called, is a condition first described by Récamier.<sup>1</sup> It is a concurrence of the interstitial form with great glandular enlargement. It is marked by excessive, diffuse, glandular, interstitial, and vascular development and by cystic degeneration of the glands. Some of the cystic glands have the character already described under interstitial endometritis; others become fungoid projections, so-called, upon the surfaces; that is, small, soft, polypoid bodies like nasal polypi, often pedunculated, variable in size, and œdematous from retained secretions. A similar polypoid development occurs also in the cervix, page 189. These changes make the endometrium exces-

<sup>1</sup> Pozzi: Union Médicale de Paris, June 1 to 8, 1850.



sively thick, soft, and œdematous. The disease includes the glandular and interstitial forms modified. Like so-called hyperplastic endometritis, it has been said to hold an intermediate place between inflammation and neoplasms. Endometritis is present, but only as a complication of the new growth, which will be again recognized under 'benign adenoma. The fibrous tissue which takes the place of the interglandular connective tissue may develop abundantly. The excessive glandular and vascular enlargement explains the chief subjective symptoms: exhaustive glandular secretions and hemorrhages. See Benign Adenoma, Chapter XXVIII.

#### CLINICAL FORMS OF ENDOMETRITIS.

The clinical varieties of endometritis may be usually referred to one or both of the histological forms. Their individual peculiarities are dependent upon intercurrent conditions. The clinical forms are:

Post-abortion endometritis.

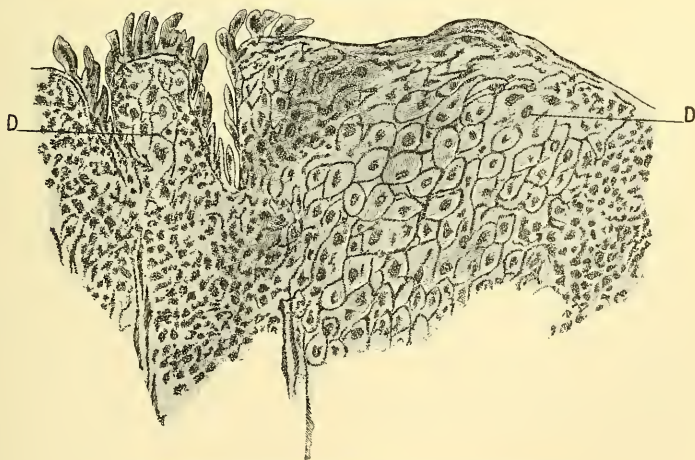
Exfoliative endometritis.

Senile endometritis.

Tubercular endometritis.

*Post-Abortum Endometritis.* Abortion may be a cause or an effect of endometritis; in either case the disease may present certain peculiarities. The inflammation, which is rather interstitial than glandular,

FIGURE 119.



Post-abortion endometrium. D, D. Decidual cells.

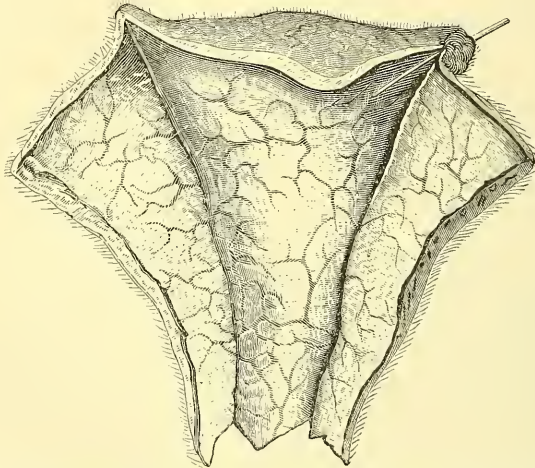
causes an arrest of involution in the mucous membrane at the site of the ovule and of the adjacent membrane—*i. e.*, of the decidua serotina and decidua vera. The arrest of involution may be only in places; this gives rise to islands of decidual cells circumscribed within the surrounding mucous membrane by the round cells of inflammatory tissue. It must be differentiated from the hemorrhagic condition due to the retention of portions of the embryo and from the endometritis



which may result therefrom.<sup>1</sup> The treatment is sharp curettage, disinfection, and drainage of the endometrium.

*Exfoliative Endometritis*, usually called membranous dysmenorrhœa, is characterized by the detachment of the outer layer of the endometrium in pieces or as a whole, and its expulsion from the uterus. It may occur at puberty, with the first menstruation, and continue indefinitely, or may commence at any time during the menstrual life. Nulliparæ and multiparæ are both subject to it. The character, quantity, and completeness of the thrown-off membrane vary with individuals, and from time to time in the same individual. The microscopic resemblance between the exfoliated membrane and the decidua of early abortion may lead to confusion in diagnosis. The cells of the detached endometrium and their nuclei, however, although sometimes enlarged, as if undergoing a change to decidual

FIGURE 120.

Cast from uterine cavity in exfoliative endometritis, membranous dysmenorrhœa.<sup>2</sup>

cells,<sup>3</sup> are never the product of conception. The membrane discharged in the course of extra-uterine pregnancy resembles that of exfoliative endometritis. The discharge of such a membrane, therefore, may require careful differential diagnosis between the two conditions. The former alone contains chorionic villi. The pains, like severe labor-pains, usually appear before and continue with remissions throughout the flow. Subjective symptoms may disappear in the inter-menstrual period, or there may be the ordinary signs of endometritis, the inflammation taking on a somewhat acute character during menstruation. The disease is persistent, intractable, often incurable. The treatment is the same as for obstinate endometritis in general—*i. e.*, thorough sharp curet-

<sup>1</sup> Schroeder: *Handbuch der Krankheiten der weiblichen Geschlechtsorgane*, Siebente umgearbeitete Auflage.

<sup>2</sup> After Coste: *Thomas and Munné, Diseases of Women*.

<sup>3</sup> C. Ruge; compare also Loehlein: *Gesellsch. f. Geb. u. Gyn.*, February, 1886. *Zeitschrift f. Geb. u. Gyn.*, xii. S. 465. A. Martin: *Diseases of Women*, p. 203.

tage, with cauterization of the endometrium, in the hope that the new endometrium may be healthy. See Treatment of Endometritis. Electrolysis after Apostoli has given only indifferent results.

*Senile Endometritis.* After the menopause, when the uterus has undergone senile atrophy, it is subject to a most harassing form of purulent endometritis; it is usually the relic of an earlier infection, and is due to the action of bacteria on the atrophic, less resisting endometrium.<sup>1</sup> The discharge contains numerous bacteria, is commonly offensive, purulent, often tinged with blood, and is so irritating as sometimes to cause a most distressing pruritus vulvæ. The infection may destroy the exhausted senile mucosa and penetrate into the muscularis. Cicatricial stenosis is frequent. Complete cicatricial occlusion in the uterine canal, usually at the internal os, often occurs. This may cause the uterine secretions to be retained and the distended organ to become a thin-walled retention-cyst. The condition is called pyometra or hydrometra, according as the contents are purulent or a watery fluid. The uterine canal, if not occluded, is apt to be narrowed at one or more places by cicatricial contraction; this obstruction to the drainage of secretions aggravates the disease. Other forms of endometritis may retard the senile atrophy of the cervix, or the corpus, or the whole uterus, long after the proper time for the complete menopause,<sup>2</sup> and the organ may remain large from this cause. Such enlargement differs from that of distention. The uterine walls in the former are thick, in the latter distended and thin. In most cases of senile endometritis the uterus is not enlarged, but rather in a state of full senile atrophy. The retained products of senile endometritis may give rise to reflex disturbances, innutrition, and to systemic depression, even to septic poisoning.

The microscopic changes are like those of atrophic interstitial endometritis, page 196. The glands and epithelial elements are finally destroyed and the submucous structures laid bare. The destruction of the glands makes catarrhal inflammation impossible. The exposure of fibrous tissue, moreover, is favorable to the development of suppuration, granulation, and ulceration—three characteristics of senile endometritis. The disease may be corporeal or cervical, or both. Laceration of the cervix is a frequent complication. The offensive discharge, the occasional uterine enlargement, and systemic depression may lead to confusion between this disease and uterine cancer. Cicatrization may bring about a spontaneous cure. Usually, however, unless cut short by treatment, the suppuration persists. The treatment is that of aggravated endometritis in general. In the worst suppurative cases vaginal hysterectomy may be necessary.

*Tubercular Endometritis.* Incipient tuberculosis of the uterus usually takes the form of endometritis. It may reach the uterus from without by hetero-infection, or may be transmitted by auto-infection from another infected organ. See Tubercular Salpingitis. Hetero-infection is rare, but may occur through the vagina by coitus or by

<sup>1</sup> Coste: from Thomas and Mundé, p. 631.

<sup>2</sup> Petru: Revue Médicale de Suisse Romane, 1893, No. 5. Abstract in Centralblatt für Gynäkologie, 1894, No. 4.

instrumental or digital interference. It sometimes occurs in the cervix in the form of sharply-cut ulcers, and when far advanced may extend to the corpus;<sup>1</sup> its clinical resemblance to cancer is then quite marked.

Auto-infection generally reaches the uterus through the Fallopian tubes.<sup>2</sup> In such cases the disease finally extends from the endometrium to the myometrium. There is also usually a prior involvement of the peritoneum. Often the pelvic organs—uterus, bladder, colon, rectum, ovaries, and tubes—are matted together by adhesions, with abscesses and broken-down tissue.<sup>3</sup> This relatively rare disease is recognized by the history of the case and by the microscope. The treatment must be the removal of the uterus and its appendages.

### Symptoms of Chronic Endometritis.

The symptoms of acute endometritis, already outlined—*i. e.*, peritoneal tenderness, hypogastric pain, pelvic weight, rectal and vesical tenesmus—may in some degree continue, but as the disease becomes chronic these symptoms cease to predominate; in their place comes a symptom-group which always contains some of the following factors:

Menstrual and intermenstrual disturbances.

Excessive mucous discharges.

Purulent discharges.

Hemorrhages.

Sterility.

Systemic disturbances and reflex disorders in other organs.

Obstructive dysmenorrhœa may result from cicatricial stenosis, especially if the menstrual blood coagulates in the uterus and is forced out by powerful contractions. The pain will then be intermittent. Intermenstrual pain from the expulsion of accumulated secretion in the uterus may occur in the same way. The excessive menstrual pain, like labor pain, in exfoliative endometritis has already been noted. Congestive dysmenorrhœa often precedes the flow, but subsides as soon as the engorged vessels are relieved by the establishment of the flow. The inflamed uterine nerves, already sensitive from neuritis, when crowded by the distended bloodvessels of the swollen uterus, easily become the seat of great menstrual and intermenstrual pain.

Hypersecretion is a constant and pronounced symptom. It may be catarrhal or purulent, or mixed, and often contains blood. Menorrhagia and intermenstrual hemorrhage commonly result from glandular and especially from interstitial endometritis.<sup>4</sup>

Sterility and abortion are frequently associated with the disease. Sterility may result from complicating ovaritis or obstruction in the Fallopian tubes, or from destruction of the spermatozoa by the uterine secretions, or from their mechanical exclusion from the uterus by the plug of tenacious mucus usually found in endocervicitis, or, as soon as the ovule enters the uterus abortion may occur from the hostile environment of the diseased mucosa. The failure of the ovule to implant

<sup>1</sup> Pozzi, vol. ii. p. 204.

<sup>2</sup> Bonnet and Pettit, p. 193, Figure 63.

<sup>3</sup> Heeberg: *Centralblatt für Gynäkologie*, 1892, No. 50.

<sup>4</sup> A. Martin: *Diseases of Women*, pp. 205, 208.



itself upon the mucosa may give rise to no subjective symptoms. Indeed, the existence of pregnancy may be unrecognized.

The systemic and reflex disorders are chiefly referable to the nervous system. Among them are neuralgia, indigestion, malnutrition, nervous dyspepsia, anæmia, chlorosis, spinal irritation, and hysteria. The endometritis may be a cause or an effect of these associated disorders, or, together with them, may be a concurrent result of some common cause, or may have had primarily no pathological connection with them.

#### Diagnosis of Chronic Endometritis.

The diagnosis of chronic endometritis is suggested by the symptoms above outlined. The introduction of the sound or probe may slightly wound the inflamed endometrium and cause great pain and slight bleeding. The different varieties have been described on the foregoing pages.

The differential diagnosis between the numerous varieties already outlined will depend upon the removal of portions of the diseased mucosa and its examination by the microscope. A very small curette, without previous dilatation, will often suffice for diagnostic purposes; at least it will settle the question whether a therapeutic curettage is necessary. The diagnosis between endometritis and adenoma, carcinoma, and sarcoma will depend, first, upon the history of the case, the nature of the discharge, and conjoined examination; second, upon the curette and the microscope. The discharges from adenoma, carcinoma, and sarcoma are more profuse, more offensive, more watery, and usually contain more blood. Cachexia and other systemic disorders are more marked. A discharge from the vagina or from a pelvic abscess opening into the uterus or vagina, or a discharge from the Fallopian tubes, may be mistaken for the product of endometritis. Inspection will show whether the discharge comes from the uterus or not; a small piece of cotton left for a few hours against the cervix will sometimes show the source. Secretions passing through the uterus from the inflamed Fallopian tube are apt to be rather periodical than constant, and the periodicity is often marked by expulsive pains in the uterus—"colica scortorum"—and followed by temporary relief from pain—*i. e.*, the tube may refill and empty itself at intervals. In some cases, however, the discharge is constant. The diagnosis requires a history of the case and physical examination. The condition is often connected with other pelvic inflammation. Pus from a pelvic abscess is recognized by finding the sinus through which it discharges; such a sinus often opens into the vagina, seldom into the uterus.

#### Prognosis of Chronic Endometritis.

Relapse is very common. The mildly infectious cases, usually called simple endometritis, yield readily to systemic treatment. The strongly infectious cases always require surgical treatment. This in most cases will bring about at least a symptomatic cure—*i. e.*, it will stop the discharge and may relieve other symptoms. Whether the diseased uterine mucosa can be restored to its functions will depend upon the



extent to which it has been impaired by the disease or must be destroyed by the necessary treatment. The prognosis is especially discouraging in exfoliative, senile, and tubercular endometritis. Hysterectomy is sometimes necessary.

#### Treatment of Chronic Endometritis.

The treatment varies with the structures involved, the nature of the infection, the chronicity of the disease, and with the preponderance of systemic or local origin. The treatment of cervical differs from that of corporeal endometritis; that of a gonococcus infection might have to be energetic and strong, while a milder infection would require only simple or expectant treatment. Obstinate cases of long standing may yield only to the most radical surgical measures. Many authors attempt to draw a line between what they call simple endometritis and septic endometritis. This line, although theoretically sharp, is clinically quite indefinite. It is better to distinguish, on the one hand, the catarrhal non-purulent cases in which general circulatory disturbances—that is, diathetic, systemic causes—predominate; and, on the other hand, the cases in which local infection predominates. In the first class of cases predisposing causes predominate; in the second class exciting causes. See page 142. The septic element is not confined to the second class, nor the systemic element to the first. An appreciation of the foregoing will suggest the following division of treatment:

1. Systemic treatment.
2. Topical treatment.
3. Surgical treatment.

1. **Systemic Treatment** is widely applicable to a very large class of cases, sometimes called subinflammatory, which arise not so much from local infection as from stagnation of the general circulation. The stagnation is usually associated with disorders of the heart, lungs, liver, kidneys, or the uric acid and other disorders, such as anæmia, leukæmia, chlorosis, diabetes, and gout. The uterus may participate in the general circulatory disturbance and take on a catarrhal condition. In this class of cases the catarrh usually involves not only the uterus, but also the extra-pelvic organs, especially the organs of the respiratory, digestive, and urinary systems. The mucous membranes generally are less resistant and therefore more liable to infection. Catarrh is often the vicarious act of a mucous membrane to throw off waste products which it would not normally have to eliminate at all. When relieved of such unnatural elimination its resistance to the microbe is thereby increased, and the infection may in this way cease.

It is clear from the foregoing that in the absence of marked local infection the treatment should be not so much local as systemic. Indeed, when the uterine disorder is mainly consequent upon systemic causes, local treatment is useless and may be injurious. On the other hand, the uterus participates in the general improvement when the extra-pelvic and systemic disorders mentioned in the preceding paragraph have been relieved. The needs are, first, a thorough diagnosis

from the stand-point of internal medicine, and, second, the treatment of any condition which may disturb the balance of the general circulation or nutrition. If the uterine secretions are purulent or systemic treatment prove inadequate, topical or surgical treatment also becomes imperative.

Rheumatic, gouty, and syphilitic subjects require their own special regulative and medical treatment. Rheumatism and gout very often cause and perpetuate the disease. It is imperative that the kidneys be made to eliminate their proper amount of urea and other solids, otherwise the burden may fall on the mucous glands of other organs, for example, the uterus. In every case, therefore, a quantitative urinalysis should be made to show the amount of solids excreted in twenty-four hours. In the uric acid diathesis lithia spring waters, or the salts of lithia in solution, are most useful. The granular effervescing citrate of lithia in copious draughts of pure, soft water is quite as good as the natural spring waters, possibly better. The diet should include less animal and more vegetable food. Anæmia, notably the anæmia of fat women, is often the cause of local engorgement, especially in the uterus. In such cases local treatment is useless. Iron, manganese, the bitter tonics, mineral waters, nutritious food, adequate exercise, and regular habits are essential. The thyroid extract has been much praised in the treatment of this class of anæmic women, and its use is said to be followed by rapid reduction of fat. Endometritis associated with syphilis will often yield to specific treatment alone or combined with ordinary treatment.

Constipation is almost constantly associated with uterine catarrh. Large accumulations of old, hard fecal matter displace and keep up a constant engorgement of the uterus and other pelvic organs. The successful treatment of constipation is essential to the relief of the endometritis. The treatment should be rather regulative than medicinal. Strong laxatives tend to congest the abdominal and pelvic organs—the very condition we want to relieve—and should therefore be avoided. Hygienic measures alone may be adequate. These include regular properly selected diet, regularity in exercise and especially in times of going to stool. Massage is a most valuable remedy, both for its direct influence on the action of the bowels and on the general circulation. Mineral waters, sulphate of magnesia, citrate of magnesia, citrate of lithia, phosphate of soda, Carlsbad salts are most useful. They are best given in copious draughts upon rising in the morning. A large draught of cold water at the same hour will often cause free action of the bowels. The conventional pill or some positive cathartic like aloin or podophyllin at bedtime, which usually acts strongly the next morning, is objectionable, and such drugs if given at all should be in small divided doses combined with iron and nux vomica, and given at least three times a day. The cathartic dose should be diminished each time the prescription is renewed until only the tonic remains. Polypharmacy is to be avoided.

Tablet triturate of calomel long continued in very small doses—one-tenth to one-thirtieth of a grain—three times a day fulfils a multiple indication. It establishes a steady stream of bile—bile is a most

effective intestinal antiseptic—through the intestines, renders the glandular organs more active, dislodges morbid accumulations, and secures proper elimination through the bowels and kidneys. All this balances the circulation and stimulates nutrition. No single drug has greater value than calomel in the treatment of the inflammatory affections of the mucous membrane when due to stagnation of the general circulation. The bichloride of mercury in minute doses—one-hundredth of a grain—may be equally useful. In the continued use of mercurial salts always observe the usual rule to secure normal freedom of the bowels, if necessary, by the judicious use of salines.

Colonic flushings of warm castile soapsuds, or of a 1 per cent. solution of sodium bicarbonate—from one to three quarts—are most useful, especially in the early treatment of obstinate constipation. They should be given in the left latero-prone position—Sims' position—or, better, in the knee-chest position. To be most effective they must be very copious, slowly given, and retained at least for several minutes. Five per cent. of glycerin adds to their effectiveness. The prompt disappearance of bearing-down, dragging pains, backache, bowel distention, intestinal indigestion, and depression which often follow the clearing out of the bowels is in striking contrast with the frequent disappointment, not to say increase of symptoms, which usually follows the time-honored topical treatment. The disease is most obstinate in virgins. In corpulent young women cure is almost impossible unless the nutrition be improved and the weight reduced.

The general and sexual hygiene, too often neglected, including dress, exercise, food, sexual relations, and care at menstruation, has already been discussed. Special attention should be given to local and general bathing. A comprehensive grasp of the subject, however, involves the whole field of general internal medicine.

2. Topical Treatment has been as much over-estimated as systemic treatment has been neglected. Multitudes of women have, unfortunately, formed the habit of receiving useless routine treatment for the relief of uterine discharges. Once eliminate the cases already described in the foregoing paragraph which require not local, but systemic treatment, and the remainder will be relatively smaller, and will be mostly made up of the clearly infectious cases. Few scientific gynecologists to-day place great value on office-treatment for distinctly infectious endometritis. The number of such cases definitely cured by topical applications, when compared with the great number treated, is insignificant. In making such comparison we must exclude numerous cases which needed only systemic treatment, and have been cured by it, notwithstanding the associated topical treatment which they did not need.

The endometrium has been the brunt of a vast amount of sometimes mild, most times useless, oftentimes destructive topical treatment. Since other organs, the nose, stomach, intestines, bladder, and eye, are subject to the same catarrhal conditions and subject to them from the same general causes, consistency would indicate topical treatment for them also. If in a given case, for example, the whole intestinal canal and bladder and endometrium were catarrhal, it might be quite as logical to apply fuming nitric acid to all as to one. Such an experi-



ment would not only show that the human uterus has endured an immense amount of abuse, but would successfully demonstrate the absurdity of topical treatment to the endometrium when the uterine catarrh is only one of many local evidences of a general condition. Clearly a large proportion of cases belong rather to internal medicine than to gynecology. Very significant is the fact that long continued and often repeated handling of the genitals may give rise to psychic irritation or depression. A woman once habituated to local treatment may even become a monomaniac on that subject.

The milder intra-uterine treatment as ordinarily practised is long, tedious, and, if not useless, at least uncertain. Such treatment, whether mild or severe, at the doctor's office or at the patient's house, if frequently repeated with indifferent aseptic care, often sets up new infection, or may carry the old infection to deeper structures. This may dangerously involve the parametric lymphatics and veins, the myometrium, Fallopian tubes, cellular tissue, peritoneum, and ovaries. As a rule, the cases which do well on mild, topical treatment would often do better on systemic treatment alone. If any exceptional cases require local applications, they never need to have them long continued.

Intra-uterine applications are usually effective in proportion to their energy. Only those which have the power to destroy the diseased structures are capable of arresting the discharge. In doing this, however, they may destroy the endometrium, injure the myometrium, and reduce the uterus to a cirrhotic-like cicatricial condition. Sterility and permanent irritability of all the pelvic organs is the natural result. Electrolysis, nitric acid, chromic acid, chloride of zinc, acid nitrate of mercury, and the actual cautery, especially if often applied, produce also cicatricial stenosis and atresia, with all their evil results. Already numerous operations have been devised with but little success to reopen the contracted uterine canal.<sup>1</sup> The chloride of zinc pencil produces a slough of the endometrium and sometimes of muscular tissue. Its use is often followed not only by a chronic purulent discharge, but by a serious infection of the appendages from the septic sloughing endometrium. The endometrium has now permanently lost its epithelial covering, the chief protection of the uterus against bacterial invasion. Contrast this condition with that in which the diseased structures have been removed by an aseptic curettage and the healthy abraded surfaces are all ready to reproduce a new endometrium. The frequent use of strong caustics to the endometrium is prohibited.

A principal mode of action of electricity is by cauterization, and it is said to have a deeper effect on the bloodvessels. Its continued use may arrest the discharge. Its chief value is in the soft flabby hemorrhagic uterus, especially in the endometritis associated with myoma. Other measures, however, are usually preferable. It is painful, tedious, often unduly destructive, and may be dangerous. Great cicatricial formations and hopeless stenosis in the endometrium are among the

<sup>1</sup> Of these, that of Otto Küstner of Breslau is the latest and most radical. *Centralblatt für Gynäkologie*, No. 30, 1895.



possible results. These effects are not limited to the diseased, but may include the healthy structure. Its immediate dangers are greater than those of aseptic curettage. Generally speaking, the method is not approved.

It is not the author's purpose to condemn unreservedly the conventional treatment. He has for years used the vaginal douche, the swabbing out of the uterus with cotton, the injection of astringents, the vaginal and intra-uterine applications of dry powders, intra-uterine pencils of various alterative and caustic substances, wool glycerin tamponade, electricity, and intra-uterine gauze tamponade. The diligent and patient use of such means has been followed by much disappointment, to say nothing of some positive harm. Topical treatment should seldom be long continued. It has a more legitimate place as a supplement than as a substitute for systemic and operative treatment. A reproach will be lifted from the medical profession when its indiscriminate use shall have been relegated to the dark ages of gynecology.

If topical treatment is to be used, especially if it is to be intra-uterine, let the aseptic precautions be as careful as for a surgical operation. See Chapter II., pages 36 to 46.

The patient should invariably have had a thorough vaginal douche of green soapsuds, with careful scrubbing of the external genitals and vagina. The cervix is exposed by Sims's speculum, and the vagina is thoroughly wiped out with dry absorbent cotton on dressing-forceps; then swabbed with cotton saturated with a 5 per cent. solution of carbolic acid or a 1 per cent. solution of creolin. Slight traction is now made on the cervix by tenacula or blunt-tooth forceps, to straighten the uterine canal, and the endometrium is cleansed by means of cotton wound on an applicator. The cervical plug of mucus, if present, should be removed. The desired application may then be carried into the endometrium by means of the applicator again wound with fresh absorbent cotton, or, if the canal be very open, by means of fine dressing-forceps. A pledget of absorbent cotton saturated with glycerin or a 10 per cent. mixture of ammoniated ichthyol and glycerin may now be placed as a protection and for its hygroscopic effect. See page 82. Over this place a pledget of dry cotton to keep the first in position and to absorb moisture. During such treatment coitus is prohibited. The vaginal cotton should be removed in twenty-four hours. Intra-uterine cleanliness is the first requisite. To secure this an open canal and drainage are essential. For this purpose the intra-uterine stem-pessary is often used, is sometimes effective, generally useless, always dangerous.

*Intra-uterine gauze tamponade* has been extensively used for dilatation and drainage in the non-operative cases. Increasing quantities of a narrow strip of antiseptic gauze are packed into the uterus from treatment to treatment, until the endometrium has become gradually dilated to a diameter of one-third or one-half inch. This dilatation permits easy and thorough intra-uterine topical treatment and drainage, especially capillary drainage when the gauze is in place. This method, in the author's hands, has been occasionally successful, but less so than the reports of its advocates would seem to promise.

Great care is necessary lest the gauze, instead of carrying out septic material, may carry it in.

It is confusing and unnecessary to name the innumerable drugs and chemicals which are lauded for intra-uterine medication. Carbolic acid and iodine, for their disinfectant and astringent effect, meet the requirements in glandular endometritis, so far as topical treatment can meet them. Ichthyol in interstitial endometritis, although useful, has not entirely fulfilled its early promise.

3. **Surgical Treatment.** When the disease is distinctly infectious and chronic, topical and systemic treatment are both inadequate, although both may properly supplement surgical measures. The diseased endometrium must be removed by the *sharp curette*. The operation is rendered extra-hazardous by active inflammation in the Fallopian tubes or by any other active parametric inflammation which renders the uterus immobile or very sensitive to the touch. If for any reason it must be done under these adverse conditions, the greatest aseptic care should be taken to prevent dangerous lymphangitis, phlebitis, and peritonitis. A general description of curettage may be found on page 104. Salpingitis, ovaritis, peritonitis, and cellulitis were formerly considered positive contraindications for invading the uterine cavity. Now these diseases, if chronic, call for special care, but do not necessarily prohibit intra-uterine operations, provided these operations are of such a character as to remove the disease from the uterus. They do, however, prohibit all intra-uterine interference which falls short of this. Ordinary intra-uterine treatment, even examinations with the sound, may be more dangerous than thorough dilatation and sharp curettage. Incomplete, dull curettage is specially dangerous, for it exposes the surfaces to absorption and at the same time may leave infectious matter to be absorbed. Inflamed tubes and ovaries often become healthy or at least symptomatically cured after the primary source of infection has been removed from the uterus. In order to facilitate the curettage and insure drainage, let the dilatation be thorough.

The *sharp curette* is not only efficient, but the recent investigations of Werth<sup>1</sup> and others show that prompt regeneration of the uterine mucosa follows its use. Studies of the recently curetted endometrium show that the work is often imperfectly done, and that large portions of the diseased mucosa, particularly in the cornua and lateral walls, are apparently inaccessible to the ordinary curette. Special small curettes should therefore be used for these parts.

Werth reports histological examinations of six uteri removed at periods varying from three to sixteen days after curettage. All cases showed unequal results of the scraping on the various parts of the uterine mucosa. Some parts were untouched. In some the superficial layers had been removed and the deeper layers left, and in other parts the muscularis had been attacked. The mucosa in the fundus and in the lateral portions of the cavity was most frequently left intact. The abrasions on the anterior wall were deeper than on the posterior.

<sup>1</sup> Centralblatt für Gynäkologie, No. 7, 1895.

They were also deeper in the lower part of the corpus near the internal os. This is explained by the convergence of the downward strokes of the curette. Except places where the muscularis had been injured by the curette, the entire lining of the uterus was covered with new mucosa, the glands opening freely on a surface of unbroken superficial epithelium. This young mucosa is characterized by a great preponderance of fibrillary connective tissue over the connective tissue of the stroma. The regenerating tissue is supplied with bloodvessels which grow out of the muscularis or out of the remaining mucosa. The vessels are surrounded with a broad mantle of fibrillary connective tissue which follows their ramifications almost to the surface of the mucosa.

The glands are regenerated from their deeper portions which the curette has spared, especially from those which are situated where the mucosa dips deep down into the muscularis; they grow out toward the surface together with the surrounding bloodvessels and fibrillar connective tissue. The surrounding stroma frequently grows more rapidly than the glands, and gives a somewhat irregular, jagged contour to the regenerated endometrium. The superficial epithelium is regenerated principally from that of the glands. The young epithelial cells are in some places flattened and enlarged. In the latter stages of the regeneration of the mucosa the excess of fibrillary connective tissue disappears by hyaline degeneration. This process on the fifth day after curettage is visible in the subepithelial layers; on the tenth day only a few fibrillæ are left in the superficial stroma; in their places are large, spindle-shaped cells, with several processes of protoplasm. Only in those parts where the muscularis has been abraded was a condition which resembled that of granulation tissue.

A thorough application of a saturated solution of iodine crystals in 95 per cent. carbolic acid to the endometrium immediately after the curettage is desirable. Its action on any neglected portion of the diseased endometrium may be good; it insures asepsis, and by its coagulating effect plugs the open lymphatics and veins, which otherwise might become the carriers of possible infection to the deeper structures. The application, if indicated by the uterine discharges, may be repeated just before the next menstruation. When the application is made immediately after the curettage all blood should have been previously washed out of the uterus and its flow, if profuse, stopped by means of a saturated aqueous solution of antipyrine. Many operators<sup>1</sup> omit the caustic application and claim that the results are better when it is not used. The author's experience has been in favor of its use. Uterine gauze tamponade immediately after curettage is strongly indorsed by most operators. Entirely good results may, however, be obtained without it. The objections to its use are that, even though lightly packed, it is often promptly expelled by powerful uterine contractions, and that instead of draining it may reinfect the uterus. The more thorough the dilatation before curettage, the less liability to expulsion of the gauze by uterine contractions.<sup>2</sup>

<sup>1</sup> Krug: American Gynecological and Obstetrical Journal, January, 1896, p. 79. Pryor: *Ibid.* p. 10.

<sup>2</sup> *Loc. cit.*



The treatment of endometritis, even with the curette, is not uniformly successful. Dilated and obstructed bloodvessels cannot always be restored to their proper calibre. Disorganized lymphatics, nerves, and glands do not always resume their normal functions. Regeneration of lost structures is not always possible. In these respects endometritis offers a close analogy to nasal catarrh. In the glandular forms of this disease, while the endometrium yet retains enough of its integrity to insure regeneration of its glandular and epithelial structures, the sharp curette offers both a symptomatic and histological cure. When the disease has progressed to the atrophic stage of interstitial endometritis and the endometrium is physiologically destroyed, only a degree of symptomatic cure is possible, and anatomical cure is impossible. When endometritis is complicated with extensive chronic metritis and obstinate pelvic infection, the uterine discharge will persist regardless of curettage or of any other intra-uterine treatment. Under such conditions hysterectomy may be the only way of relief. Since this extreme measure might be indicated more for the extra-uterine than for the uterine inflammation, its consideration is deferred to the section on inflammation of the uterine appendages.

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## CHAPTER XVIII.

### CHRONIC MYOMETRITIS.

**Hypertrophic Myometritis. Interstitial or Cirrhotic Myometritis. Superinvolution. Non-puerperal Atrophy.**

CHRONIC myometritis is suggested as a term to describe inflammation of the myometrium. See page 187. This term is more precise and, therefore, preferable to the usual term, chronic metritis. The disease is almost always secondary to endometritis and coexistent with it. It is often associated with inflammation of the perimetrium and parametria. Round-cell infiltration and other phenomena of inflammation are usually though not always apparent; hence the condition does not always conform to the strict idea of inflammation. Heart, lung, and other visceral diseases which embarrass the circulation appear to cause conditions which are histologically similar to if not identical with myometritis.

There are two forms of the disease, the hypertrophic, in which there is increase of all the histological elements, and the interstitial, or cirrhotic, in which there is an increase of the connective and loss of the muscular tissue. This has been called areolar hyperplasia. The second form often follows the first. In fact, the most frequent anatomical factor in the later stage of myometritis is increase of intermuscular

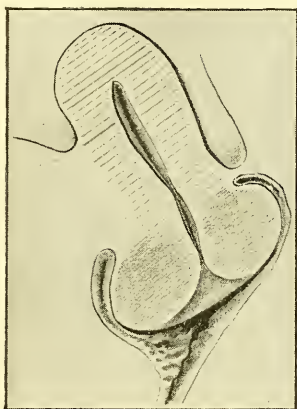


connective tissue. The causes are largely those of antecedent endometritis. Any infection of the endometrium may extend to the myometrium, but such extension is more likely to occur as a sequel of labor or abortion.

### Hypertrophic Myometritis.

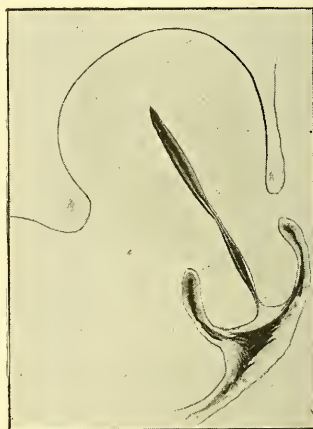
*Subinvolution* is a frequent example of hypertrophy, and is produced as follows: The muscular elements, enormously increased during the evolution of pregnancy, fail to undergo the normal physiological degeneration and absorption after labor. The connective tissue also remains superabundant. The lymph and bloodvessels continue large, full, and stagnant. The uterine walls are thickened from congestion and infiltration. The entire uterus is usually, though not always uni-

FIGURE 121.



Hypertrophy of the cervix uteri; the spreading apart of the cervix is due to laceration and eversion.<sup>1</sup>

FIGURE 122.



Hypertrophy of the corpus uteri.<sup>1</sup>

formly, enlarged, that is, the hypertrophy may pertain especially to the cervix or to the corpus uteri. The uterus may be twice as large as normal and its canal may measure three or four inches. The organ remains soft and mobile. This flexibility accounts for the fact that many uterine flexures date from the puerperium. Subinvolution may therefore be defined as the failure of a physiological hypertrophy to subside after labor.

*Non-puerperal hypertrophy* is pathological from the beginning and often occurs in women who have never been pregnant. It is sometimes clinically impossible to distinguish between the puerperal and non-puerperal varieties. Both are apt to be the result of myometritis.

Great hypertrophic elongation of the supravaginal and enlargement of the infravaginal portions of the cervix, with descent, are described in the chapters on Laceration of the Cervix and Displacements. The

<sup>1</sup> From Thomas and Mundé, Diseases of Women.

hypertrophic enlargement sometimes chiefly pertains to the corpus, and sometimes to the cervix, or may uniformly involve the entire organ. Hypertrophy of the cervix is often confounded with laceration. The symptoms, like the causes, are almost identical with those of the associated endometritis. In the absence of marked endometritis, perimetritis, and parametritis the uterus is not very sensitive to the touch. Downward displacement from increased weight is usual. Perverted menstrual and other functions are the same as in endometritis. The prognosis is much more favorable for puerperal than for non-puerperal myometritis. Subinvolution, if non-infectious, is often only temporary. The disease is apt to be obstinate and destructive in proportion as the infectious element predominates. The treatment is largely that of the associated endometritis.

#### Interstitial or Cirrhotic Myometritis.

Hyperplasia of the connective tissue, whether puerperal or non-puerperal, may follow hypertrophy or may develop independently of it. This form of the disease often results in a sort of pathological involution, with the following permanent changes: The lymph, and bloodvessels shrink and wither, the nutrition of the muscular elements is cut off, and they disappear as if crowded out by the increasing connective tissue; the uterus now becomes hard and anæmic; it may still remain large from the superabundant connective tissue, but finally this may contract and, cicatrix-like, reduce the organ even below its normal size. The influence of these changes upon the nerves is great irritation and subsequent pain. The whole organ with its appendages and adjacent structures is in a state of permanent malnutrition. In extreme cases of utero-salpingitis the uterus and its appendages may have to be removed. See Inflammation of the Uterine Appendages. Local treatment is very unsatisfactory.

#### Superinvolution.

Superinvolution, as the word implies, is an excess of involution. The process of degeneration and absorption after labor passes beyond the physiological limits, and the uterus shrinks below its normal size and becomes soft and excessively mobile. The condition resembles the senile atrophy of the menopause. Apparently there are two distinct varieties of superinvolution, one temporary, the other permanent. They are differentiated by the fact of a normal puerperium in the temporary variety, and in the permanent variety by the history of a febrile puerperium. In the latter variety one or more of the reproductive organs or parts thereof—*i. e.*, the endometrium, myometrium, and uterine appendages—become infected and physiologically destroyed. In the temporary variety spontaneous recovery may occur and the woman may again bear children. In the destructive form there is permanent atrophy of all the structures involved. Menstruation, if it returns at all, is scanty and generally painful. Immediate amenorrhœa is the rule. There is sometimes a painful molimen in place of menstruation.

## Non-puerperal Atrophy.

There is another class of cases in which atrophy of the reproductive organs occurs independently of parturition. This form of atrophy is generally the result of chronic wasting disease, like tuberculosis and diabetes, or of acute infectious disease, like scarlatina, rubeola, and enteric fever. There is always cessation of menstruation. This is a conservative effort of nature to save the patient's blood and strength. Unfortunately, however, the ill health is often wrongly attributed to the amenorrhœa, and treatment designed to stimulate and re-establish menstruation is sometimes used. By such means the woman's vitality may be still further exhausted. The above facts from the therapeutic stand-point, especially in tubercular and other wasting diseases, are very significant. Clearly the treatment should not be local, but systemic.

Superinvolution and non-puerperal atrophy are rare; their causes are obscure; the precise relation of inflammation to their development is not known. Except in the temporary non-infectious form already mentioned, recovery rarely or never takes place. Electricity, spongetents, local massage, and all other forms of local treatment are of questionable value. Internal medicine and general hygiene are indicated for their systemic but not for their local effect.

## CHAPTER XIX.

## PELVIC INFLAMMATION.

## Anatomy. Routes of Infection. General Etiology and Significance of Pelvic Inflammation.

INFLAMMATION of the uterus, as outlined in the foregoing chapter, may extend to the surrounding lymph channels, veins, cellular tissue, Fallopian tubes, ovaries, and peritoneum. The subject of pelvic inflammation must, therefore, include lymphangitis, phlebitis, cellulitis, salpingitis, ovaritis, and pelvic peritonitis.

## Anatomy.

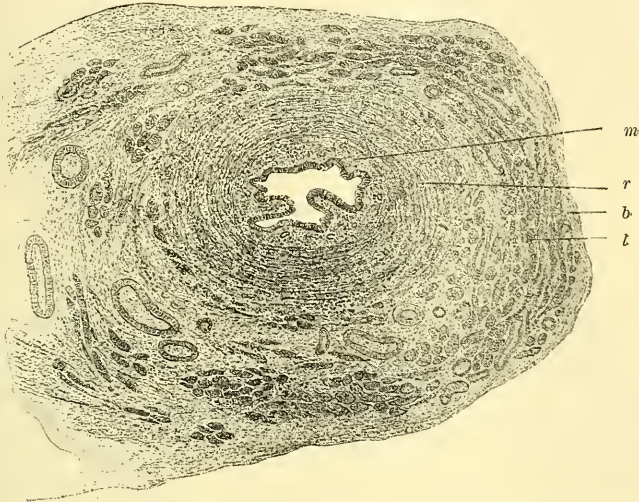
The Fallopian Tubes are developed by that part of Müller's ducts above the round ligaments. The part below the round ligaments, together with the Wolffian ducts, converge to form the uterus and vagina. The tubes, therefore, are directly continuous with the uterus. The bifurcated uterus of the lower animals is a combination of these two organs. The mucous, muscular, and peritoneal layers of the uterus are directly continuous into and form the tubes. By analogy of uterine nomenclature these three layers of the tube are named from within outward, as follows :



1. The endosalpinx.
2. The myosalpinx.
3. The perisalpinx.

The tubes extend from the horns of the uterus outward on either side and follow a bending course along the upper border of the broad

FIGURE 123.



Cross-section of the normal Fallopian tube at the ostium uterinum. Hartnack Oc. 2, Obj. 2. *m*. Mucosa. *r*. Circular muscle fibres. *b*. Longitudinal muscle fibres. *t*. Subperitoneal connective tissue.<sup>1</sup>

ligament to a variable length of from three to five inches. They are divided into three parts:

The isthmus.

The ampulla.

The fimbriated extremity.

*The Isthmus*—*i. e.*, the constricted portion of the tube—starts from the endometrium at the horn of the uterus, runs through the uterine wall, and continues outward toward the lateral wall of the pelvis about one inch. The calibre of the isthmus at the uterine junction, *ostium uterinum*, is so small as scarcely to admit a bristle. This constricted portion, unless dilated by disease, would prevent an intra-uterine injection or secretion from entering the abdominal cavity. It also serves to protect the tube against infection from the uterus and the uterus against infection from the tube.

*The Ampulla* is the expanded portion of the tube, and easily admits the uterine probe. It runs from the isthmus backward and downward around the outer border of the ovary, and terminates in an expanded, trumpet-shaped part called the infundibulum.

*The Fimbriated Extremity* at the abdominal opening is really the termination of the ampulla. It is made up of irregularly-shaped pro-

<sup>1</sup> August Martin. Krankheiten der Eileiter.

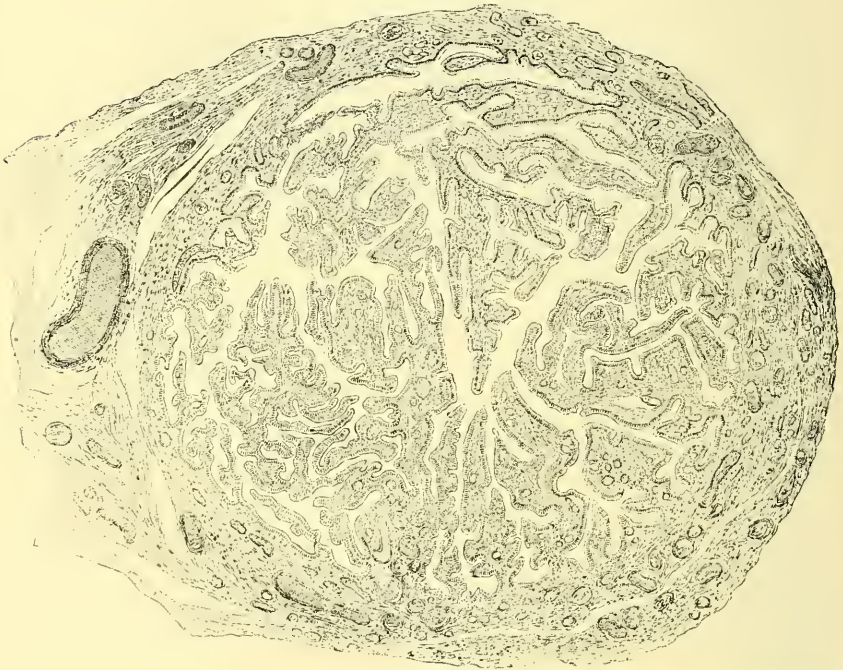


cesses, all freely movable except one, which runs along the tubo-ovarian ligament and joins the ovary. These fimbriæ are branches from the high mucous folds of the endosalpinx.<sup>1</sup>

The abdominal openings of the tube are sometimes multiple, with more than one fimbriated extremity for a single tube.

The *Endosalpinx*, or mucous lining, continuous with that of the uterus, is made of loose connective tissue covered with a single layer of ciliated columnar epithelium. The cilia are always directed toward the uterus, and probably serve to propel the ovum in that direction. The mucosa in the isthmus is relatively smooth; in the ampulla it rises in numerous high folds. This is abundantly shown in cross-section by Figure 124. The presence of glands in the Fallopian tube has been

FIGURE 124.



Cross-section of the normal Fallopian tube at the ostium abdominale. Hartnack Oc. 2, Obj. 2.<sup>2</sup>

denied. Bland Sutton, after an extensive comparative study of the tubes of the lower animals and of woman, proved that the plications or folds of the tubal mucous membrane are disposed on the same principle as the glands in the uterus.

The probable function of the Fallopian glands is to provide an albuminous fluid for the ovum as it traverses the tube. The tube participates only in slight degree if at all in menstruation.<sup>3</sup> As shown in ectopic gestation, it retains some power to fertilize the ovum.

<sup>1</sup> Pozzi. *Medical and Surgical Gynecology*, vol. ii. p. 2, Fig. 1.

<sup>2</sup> From August Martin. *Krankheiten der Eileiter*.

<sup>3</sup> Pozzi. *Ibid.*, p. 38. Landau and Rheinstein. *Archiv für Gynäkologie*, vol. xlii. p. 273.

*The Myosalpinx* is made of two muscular layers, internal circular, and external longitudinal. These layers are continuous with the corresponding layers in the uterus. It is not known whether the tube has peristaltic power.

*The Perisalpinx* or peritoneal investment of the tube, meets the mucous lining at the abdominal opening. It covers about four-fifths of its circumference and, converging toward the broad ligament, forms a narrow mesosalpinx. Between the layers of the mesosalpinx is an abundance of loose connective tissue through which the lymph and bloodvessels and nerves directly reach the tube.

**Ovary.** The abdominal end of the tube is normally close to the ovary and communicates with it by the tubo-ovarian ligament. The ovarian ligament connects the ovary with the uterus. Between the insertions of these two ligaments the ovary is joined to the posterior fold of the broad ligament by a broad base, the hilum, through which pass its lymphatics, bloodvessels, and nerves. Above the hilum the ovary is covered, not by peritoneum, but by germ epithelium, so-called, which forms the Graafian follicles and from which the ova originate. The minute anatomy of the ovary is further considered in the chapters on Ovarian Tumors.

**Cellular Tissue.** An abundance of loose *cellular tissue* binds all the pelvic viscera together. It is continuous with the cellular tissue of the uterus and its appendages, is found in large quantities especially in the broad ligaments, is the medium through which the lymph and bloodvessels and nerves connect the uterus with its appendages, and brings them all into close anatomical, physiological, and pathological relations. This cellular tissue, and particularly that of the broad ligaments, becomes therefore a most significant factor in pelvic infection.

### Routes of Infection.

Since the source of circumuterine infection is usually endometritis, it follows that the routes by which it passes to the outlying structures must lead often from the endometrium. Two such routes have already been outlined, one by continuity of mucosa, another by the lymph and bloodvessels. See Chapter X.

*The route by continuity of mucosa* is supported by the facts, first, that endosalpingitis is known to follow endometritis when there is no involvement of the lymphatics or veins or para-uterine connective tissue; second, that the same microbes are found in the inflamed mucosa of the uterus and tubes when there is no inflammation of the sub-mucous connective tissue; third, that the tubal infection is sometimes limited to the uterine end of the tube and directly continuous with similar inflammation in the horn of the uterus.<sup>1</sup> See *Salpingitis Isthmica Nodosa*.

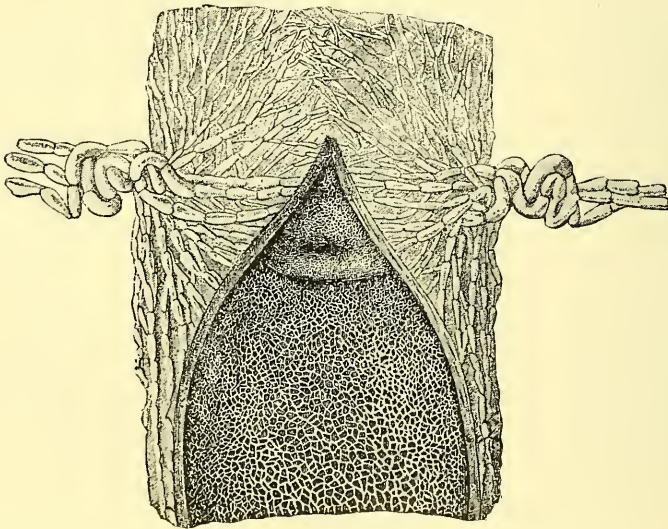
*The lymphatic and venous routes* are evidenced, first, by the frequent presence of salpingitis only in the abdominal end of the tube; if it had travelled from the uterus by continuity of surface the intervening

<sup>1</sup> The author is indebted to Dr. Emil Ries for certain abstracts from the literature on the anatomy and pathology of salpingitis and ovaritis.

mucosa would usually, though not necessarily, have been infected; second, the para-uterine lymphatics and veins, together with the connective tissue around them, are often infected when the Fallopian tubes are normal.

The relative frequency of these two routes is unknown. The gonococcus, formerly thought to thrive only on epithelial surfaces, has been found in connective tissue, and is known to be carried by the lymph route.<sup>1</sup> Its presence in the uterine muscles<sup>2</sup> and in the endocardium<sup>3</sup> has also been demonstrated. The propagation of other infectious microbes in the blood and lymph vessels, and their transmission through them, has long been recognized. The investigations of Leopold<sup>4</sup> show the endometrium to be so abundantly supplied with lymphatic vessels that it has even been called a lymphatic gland. The lymph route, therefore, is demonstrable both from the bacterial and from the anatomical stand-points. The route by continuity of surface may also be a lymph route, that is, the infection may spread through the lymphatics of the mucosa.

FIGURE 125.



Lymphatics of the cervix and upper third of the vagina. See also Figure 106 and a figure of the lymphatics in the chapter on Carcinoma Uteri.<sup>5</sup>

The lymph vessels run from the uterus outward into the cellular tissue between the folds of the broad ligaments, along parallel to the tubes and the ovarian ligaments to the inguinal, obturator, and iliac lymph glands.<sup>6</sup> These vessels are in direct communication with the pelvic peritoneum, Fallopian tubes, ovaries, and para-uterine cellular

<sup>1</sup> August Martin. *Lehrbuch der Frauenkrankheiten*, 1895.

<sup>2</sup> August Martin. *Centralblatt für Gynäkologie*, 1895.

<sup>3</sup> Leyden.

<sup>4</sup> Leopold. *Archiv für Gynäkologie*.

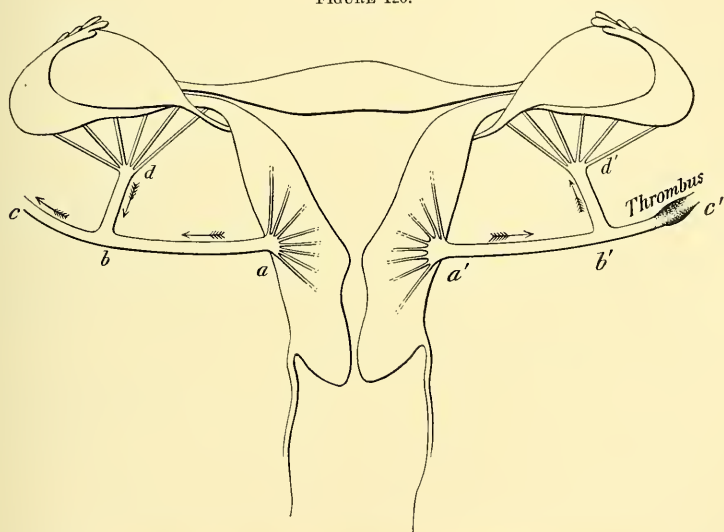
<sup>5</sup> After Poirier, in Pozzi. *Treatise on Gynecology*.

<sup>6</sup> Poirier. *Le Progrès Médical*, 1889.



tissue. The diagrammatic drawing, Figure 126, shows on the left side the course of the normal circulation in the uterine and tubal lymphatics and veins. Observe that the current is outward both from the uterus and from the tubes. The vessel, *a b c*, would carry the infection away from the uterus to the parametria, but it would not be expected to pass from *a b c* to the tube over *b d*, because the course through that vessel is in the opposite direction. Suppose, however, thrombosis to occur in vessel *a' b' c'* between *b'* and *c'*, as shown on the opposite side. Then the outward current of *a' b'* might be strong enough to overcome the force of the current *d' b'* and turn its force in the opposite direction, as shown by the arrows, direct to the tube. The same condition and the same explanation would account for the transmission of infection to other extra-uterine pelvic organs, even though the natural current were in the opposite direction.

FIGURE 126.



Shows reversal of current in lymphatics or veins due to thrombosis.<sup>1</sup>

Reversal of the current is, however, unnecessary for the most part to explain infection by the lymphatics, in which the circulation is very sluggish, and therefore does not strongly oppose the transmission of infection; moreover, infection may, to a very great extent, be carried with the circulation direct. The veins anastomose freely, their current is strong, and requires, therefore, a decided obstacle to give it a new direction. Transmission against the venous current, therefore, is more difficult and less frequent. The final delivery of infection from the uterus to the tubes by the veins probably occurs only when the current is reversed by extensive thrombic plugging.

Transmission by continuity of mucosa does not invariably involve all the epithelial surfaces over which the infection has passed. It is

<sup>1</sup> Suggested by Ries.



probably possible, although not usual, for infection to travel from the endometrium to the abdominal end of the tube without intervening infection of the uterine end. Even though the uterine end has been infected, it may, owing to its smoother surface and greater resistance, have recovered, leaving the disease only at the abdominal end.

The lymph route may be the mere carrier of infection, and may itself show no trace of inflammation, or it may be inflamed throughout; this is because the bacteria by whatever route carried will colonize at points of least resistance, and because the resistance along the route may or may not be sufficient to withstand their force. Freedom from infection in the vessels therefore does not prove that infection has passed by continuity of mucosa.

A third route of infection of extra-pelvic organs is illustrated by the cases of Binkley<sup>1</sup> and Robb.<sup>2</sup> Binkley's case was purulent salpingitis following purulent appendicitis, a sequence frequently observed. Tubercular peritonitis<sup>3</sup> often extends to the tube, ovary, and uterus. In very rare cases it originates in the cervix uteri and reaches the ovaries and tubes from that point.<sup>4</sup> Usually it spreads from the peritoneum.

#### Etiology of Pelvic Inflammation.

Since extra-uterine pelvic infection usually originates in the endometrium, its causes will for the most part correspond with those of endometritis. It may, however, start from infection in the intestines, bladder, peritoneum, or vagina. Inflammation of the uterine appendages may be a sequel of the acute infectious diseases. Pelvic hæmatocele may become the seat of infection and be the predisposing cause of a pelvic abscess. See Tubal Pregnancy.

Laceration of the perineum and cervix, and other traumatism of parturition and of surgery, may open the way for the entrance of infection through the blood and lymph channels. The puerperal and traumatic infections more frequently take this route. Infection may be carried to the uterine appendages from external cervicitis.<sup>5</sup>

The microbes of the infectious diseases have been quite generally found in the genitals. Among them are the gonococcus, the tubercle bacillus, the streptococcus and staphylococci, the bacterium coli communis, the pneumococcus,<sup>6</sup> the typhoid bacillus,<sup>7</sup> the microbe of diphtheria,<sup>8</sup> and the bacillus of malignant œdema.<sup>9</sup> At least two cases of actinomycosis have been reported.<sup>10</sup> One of the most frequent modes of infection is by uncleanly operations, local treatments, and examinations.

<sup>1</sup> Binkley. Cincinnati Lancet and Clinic, March 31, 1895.

<sup>2</sup> Robb. Johns Hopkins Hospital Bulletin, 1892, No. 20.

<sup>3</sup> Hegar. Genital tuberculose der Weiber. Stuttgart, 1896.

<sup>4</sup> Williams. Johns Hopkins Hospital Report, 1892.

<sup>5</sup> Bland Sutton. Surgical Diseases of the Ovaries and Fallopian Tubes, 1891.

<sup>6</sup> Frommel. Centralblatt für Gynäkologie, 1892, No. 11.

<sup>7</sup> Werth. Deutsche medicinische Wochenschrift, 1893, No. 21.

<sup>8</sup> Witte. Zeitschrift für Geburtshülfe und Gynäkologie, 24.

<sup>10</sup> Zemann. Med. Jahrb. Wien, 1883. Centralblatt für Gynäkologie, 1884, p. 560. Grainger-Stewart and Muir, Edinb. Hosp. Reports, 1; Monatschr. f. Geb. und Gyn., 1895, quoted by A. Martin, Krankheiten der Eileiter, p. 189.

<sup>8</sup> Ibid.

## Significance of Inflammation.

Circumuterine inflammation involves diverse changes in the Fallopian tubes, ovaries, pelvic peritoneum, lymphatics, lymph spaces, veins, and pelvic cellular tissue. Infection of the Fallopian tubes or ovaries may have the closest relation with infection of any or all of these structures. In this connection it is essential to grasp not only the nature and anatomical results, but as well the significance of the inflammatory process. The greatest danger is not from the inflammation, but from the infection. Inflammation is an effort of nature to defend the general system against infection. See page 141. If the infection has passed by continuity of surface into the tube, it no sooner reaches the pelvic cavity than the peritoneum attempts to protect itself from further invasion by prompt closure with inflammatory adhesions of the abdominal opening of the tube. The uterine end may likewise be closed, and the poison thereby shut off also from the endometrium.

If the infection has reached the pelvic cavity and produced peritonitis, unless the inflammatory process promptly confines the poison by thrombic plugging of the vessels, unless the lymph effusions are shut off with peritoneal adhesions and a protective wall is formed, the infection will speedily involve the whole peritoneum, and the infectious poison will be rapidly increased and poured in fatal quantities through the broad peritoneal surfaces into the general circulation.

We are familiar with the profound depression of the nervous system, the continued nausea, the anxious facies, the parietic and distended bowels, and the tympanites which go to make up the symptom-group of peritonitis. These grave symptoms are wrongly attributed to peritonitis; they are rather the result of the profound ptomaine poisoning which the peritonitis is perhaps unsuccessfully striving to shut off from the general circulation.

When the infectious poison starts from the endometrium and goes forward by way of the lymph channels or veins in the cellular tissue of the broad ligaments, these vessels may simply transmit the poison to the peritoneum, tubes, or ovaries, and themselves escape infection, or the course of the poison may be arrested by thrombic plugging of the vessels and by consequent extensive and destructive perilymphangitis or periphlebitis. The result may be an almost overwhelming pelvic cellulitis. The inflammation may be for the most part confined and the poison may spend its force within the limits of the cellular tissue of the broad ligament. The destructive process in the tissue may be so great as to end in permanent impairment of the pelvic nutrition and in chronic invalidism, but the pelvic cellular tissue has taken the brunt of the poisonous attack, sacrificed itself, and perchance saved the life of the woman. See the following chapter on Pelvic Cellulitis.

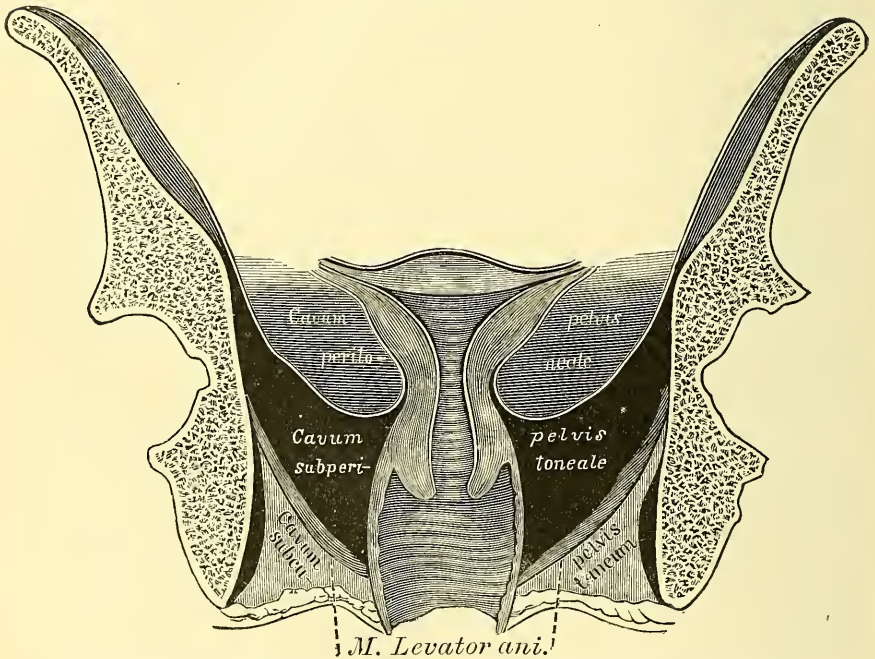
## CHAPTER XX.

## PELVIC CELLULITIS.

BEFORE reading this chapter on Cellulitis, the student is requested to consult the previous paragraphs on the Significance of Inflammation.

Exception has been taken to the name cellulitis, since all tissues are made of cells, and since, therefore, in the wide sense, all inflammation is cellulitis. The word is here used in accordance with the established usage, and is limited to inflammation of the cellular tissue around the

FIGURE 127.



Three divisions of the pelvic cavity, viz., peritoneal, subperitoneal, and subcutaneous.<sup>1</sup>

uterus and vagina, more especially that between the folds of the broad ligaments. The term parametritis is too restricted, since the disease may occur in the lower regions of the pelvis around the vagina and bowel. Cellulitis bears somewhat the same relation to peritonitis as pneumonia bears to pleuritis; that is, it is usually associated with a variable degree of peritonitis.

<sup>1</sup> After Fehling. Lehrbuch der Frauenkrankheiten.



### Etiology.

Parametritis, or, as it is commonly called, pelvic cellulitis, is usually of puerperal origin. Its causes, therefore, are largely identical with those of puerperal infection. The etiology in general is considered on page 141. The gonococcus has been found in connective tissue. Hegar has observed it in the lymph vessels of the parametria. The most frequent bacteria in cellulitis are the common pus cocci. The source of the infection is usually the inflamed uterus, but it may start from the perineum, vagina, bladder, or rectum. The rectum, urethra, and bladder are frequent sources of cellulitis in men. It may be due also to unclean therapeutic appliances, such as tents, pessaries, and to non-aseptic manipulations generally. Traumatism, especially those of parturition, open the way for the entrance of the bacteria. Although cellulitis most frequently occurs as the result of puerperal infection, it is by no means confined to that state.

### Pathology and Pathological Anatomy.

The disease may affect not only the cellular tissue in the broad ligaments, producing parametritis, but sometimes the utero-sacral or utero-vesical cellular tissue may be involved, and occasionally the disease encircles the uterus and makes a circumuterine cellulitis.

The infection reaches the cellular tissue by way of the lymph channels or veins, and is primarily, therefore, a lymphangitis or phlebitis. The lymph spaces have no walls save the cellular tissue around them, and inflammation of this tissue must be cellulitis. When infection is travelling by way of the lymphatic vessels and veins, which have walls, and inflammation results, it will first be in the walls. An early attempt is made to check the spread of the disease by thrombosis. Destruction of the walls of the vessels may follow. The inflammation will then spread to the surrounding structures. This would be perilymphangitis or periphlebitis. The tissue around the vessels, however, is cellular or connective tissue. The disease in its full development is therefore cellulitis. Hence to define cellulitis as perilymphangitis or periphlebitis might be strictly accurate.

The cellular tissue of the pelvis binds the various organs together and fills nearly all the space in the pelvis not occupied by them; it exists in great quantities around the uterus, vagina, rectum, bladder, and the psoas and iliacus muscles, and furnishes an abundance of material for the development of cellulitis.

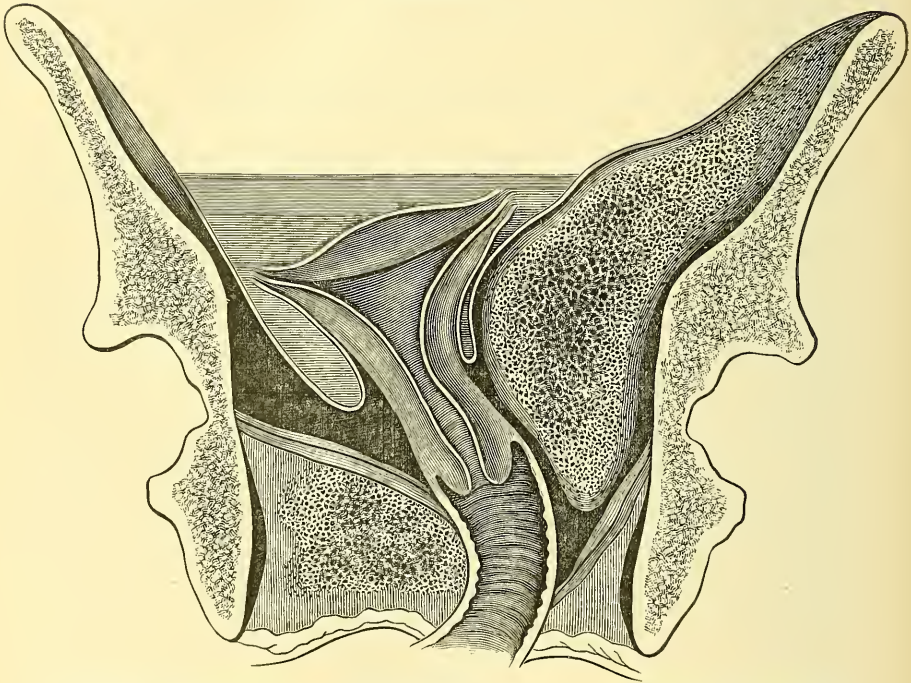
Cellulitis, like other inflammations, is divided into three stages: 1, congestion; 2, effusion; and 3, suppuration. The disease may terminate with either of these stages. Successful abortive treatment may arrest it in the congestive stage. If it goes to effusion it may end in resolution and complete recovery, or continue as chronic cellulitis, or may go on to suppuration and form a pelvic abscess.

The blood and lymph vessels here and there are plugged with firm inflammatory thromboses. If resolution does not follow, the throm-



bores break down and the corresponding spaces are filled with pus. The infection spreads from these small collections, which are, in fact, small abscesses, and frequently leads to the formation of single or multiple abscesses in the broad ligaments. These abscesses creep along the meshes of the loose connective tissue, avoiding the firmer and stronger parts, and unless opened burst into the vagina, bladder, or intestine, or above Poupart's ligament, rarely below it, or into the labia majora. Abscesses of cellulitic origin most frequently burst into the vagina; those of tubal origin, especially if surrounded by peritoneum, are more apt to break into the bowel or bladder. The bursting of an abscess to the cutaneous surface or into an organ which affords ready drainage may, if it does not cause fresh infection, be followed by spontaneous cure. The breaking of an abscess into the peritoneum may set up fatal peritonitis.

FIGURE 123.



Parametritis. Exudate in left subperitoneal cavity, crowding corpus uteri to right. Paracolpitis in right subcutaneous cavity, crowding cervix uteri and vagina to left. This latter would produce a perianal abscess, and would usually be followed by fistula in ano.

In very severe cases, with extensive invasion of the lymphatics, the whole cellular tissue of the pelvis may be involved in paracystitis, paracolpitis, paraproctitis, and parametritis. This type usually results in multiple abscesses and great systemic disturbance. It is known as the *erysipelas malignum internum* of Virchow, or *diffuse cellulitis* of Pozzi. There may also be extensive hemorrhages from destruction of the bloodvessels. The clinical picture in these cases is that of an

acute general septicæmia. The infection may result in general peritonitis and accumulations of pus may form throughout the abdominal cavity. The condition is rare and the mortality great.

Formerly cellulitis was considered the central lesion in pelvic inflammation. Salpingitis, ovaritis, and peritonitis were scarcely recognized as surgical diseases. A great advance was made in practical pelvic pathology when Battey, Hegar, Tait, and others showed the vastly greater relative importance, from the surgical stand-point at least, of tubal inflammation. When purulent accumulations in the pelvis were commonly attributed to cellulitis, when they were usually left to themselves or treated by incision and drainage into the vagina, the failures were many and unexplained. As soon, however, as they were generally recognized as accumulations of pus in the Fallopian tubes, it was easy to understand why incision and drainage were so often followed by failure. It was because the tube is lined by mucous membrane and because chronic suppuration of mucous surfaces, even though drained, is most intractable. On the other hand, a cellulitis abscess surrounded by cellular tissue when emptied naturally closes spontaneously. Pelvic cellulitis, therefore, unless complicated by tubal communication, either terminates rapidly by resolution with complete recovery, or, if suppuration occur, it empties itself spontaneously or is emptied by incision, and, like a furuncle, which it resembles, promptly disappears; hence the cellulitis abscess, unless of tubal origin, seldom becomes chronic, and therefore has little or no part in the more frequent and more familiar chronic pelvic suppuration for which the uterine appendages and sometimes also the uterus have to be removed.

The clinical experience of the laparotomist shows pelvic suppuration to be almost always in the tube. It rarely shows a trace of pus in the cellular tissue below, and if, perchance, an abscess be found there, it usually gives evidence of having burst from the tube into the broad ligament.

The above facts have led to a tendency of late years, especially among laparotomists, to deny the existence of pelvic cellulitis, and to announce the almost universal proposition, except in rare instances of puerperal origin, that cases of extra-uterine pelvic inflammation are essentially of tubal development, that ovaritis and peritonitis are always secondary to tubal disease, and that an abscess in the broad ligament is only there when a previous infection of the Fallopian tube has forced its way through the mesosalpinx into the parametrium. In this connection let us remember that the disease occurs in men, who have no Fallopian tubes. Why should the cellular tissue of the pelvis be free when the same tissue in every other part of the body is subject to infection? Would it not be just as reasonable to assume that pleuritis is the central lesion in all pulmonary infection, or that perinephritis is the essential factor in all cases of contracted kidney? The question, however, is not settled by *a priori* reasoning. Post-mortem studies prove the frequent existence of acute cellulitis abscess not only by rupture from sactosalpinx into the parametric cellular tissue, but also by the direct, lymphatic or venous route.

*Chronic Atrophic Cellulitis.* There is a form of chronic cellulitis,

described by Freund, characterized by atrophic changes analogous to cirrhotic disease in other organs.<sup>1</sup> This disease may originate in inflammation of the uterus, bladder, or rectum, and is especially apt to include chronic atrophic pericystitis and periproctitis—*i. e.*, inflammation of the connective tissue around the rectum and bladder. This would cause contraction of these viscera and shortening of the vagina.

The atrophic contracted cicatrix-like cellular tissue may cause lateral versions and flexions of the uterus. Since, however, the symptoms would be due rather to the cirrhotic disease than to the uterine deviation, mechanical support in these displacements is of little value. Perineuritis; neuritis; destruction of blood and lymph vessels; pinching of the nerves, lymphatics, bloodvessels, and ureters by the contracting cellular tissue; pain, local malnutrition, a wide variety of reflex nervous disturbances, and chronic invalidism are among the results of the atrophic process.

By contrast with the chronic atrophic cellulitis of Freund is a form described by Stapfer.<sup>2</sup> It consists of hard, œdematous indurations in the abdominal walls and in the walls and floor of the pelvis. The disorder is characterized by pelvic discomfort and pain. The pain is sometimes neuralgic in character, usually inconstant, transitory, and severe. The inflammation is of very mild type, with slight systemic disturbance. The transient nature of the disease suggests the analogy of urticaria and a probable angioneurotic element in its causation. Stapfer declares that the condition is common, and often mistaken for more serious affections.

### Symptoms and Diagnosis.

The symptoms are nearly identical with those of inflammation of the uterine appendages. The reader is therefore referred to that subject, especially when the inflammation is secondary to salpingitis or ovaritis, or situated in the upper part of the broad ligament near the tubes and ovaries. When the disease is at or below the base of the broad ligament away from the appendages, the location of pain and swelling will correspond to that of the inflammation. In acute cellulitis there will be severe radiating pain, high fever, chills, great local sensitiveness, pain shooting down the thighs, inability to walk or stand, and painful urination and defecation. Acute symptoms may decrease, and when suppuration occurs reappear, modified by hectic signs.

Pus in the subperitoneal cellular tissue, whether connected with tubal suppuration or not, may burrow through the loose cellular tissue and discharge anywhere in the vagina, rectum, or through the cutaneous surface above Poupart's ligament. Complete recovery in the non-tubal cases may promptly follow free evacuation. Abscess formation is usually marked by chills, and later the presence of pus is attended by hectic fever.

The diagnosis of parametritis when connected with tubal disease is

<sup>1</sup> Freund. *Parametritis chronica atrophicans circumscripta et diffusa*. *Centralblatt für Gynäkologie*, 1886, p. 447.

<sup>2</sup> Stapfer. *Annales de Gynécologie*, July, 1893.



necessarily confused with that of the original affection; it is simply an extension of the latter into the broad ligaments. When salpingitis and parametritis are due to simultaneous infection, as often occurs in the puerperal condition, the difficulty of diagnosis is increased. Indeed, a thorough examination in the beginning is usually very painful, and therefore impracticable. On palpation the exudate of cellulitis is lower in the pelvis than sactosalpinx, less strictly defined as to its boundaries, generally unilateral, occasionally bilateral, or before or behind the uterus. On the other hand, if the tube alone is distended, it is felt more retrolaterally than laterally, and is more elastic than the cellulitis exudate. The elastic sense of fluctuation is more marked in the thin walls of hydrosalpinx than in the thick walls of pyosalpinx, hence parametric exudate is more likely to be confounded with the latter.

Pelvic hæmatoma or hæmatocele—*i. e.*, hemorrhage into the parametrium, forms a tumor the same in shape as that of inflammatory exudate. Its history, however, is characterized by the sudden onset, overwhelming pain, subnormal temperature, and, in some cases, rapid absorption with complete recovery. Hæmatocele may, however, terminate in infection and abscess. See Tubal Pregnancy.

Pelvic peritonitis is generally the result of tubal disease, and may be confused with cellulitis. In fact, there is usually more or less peritonitis with cellulitis. The symptoms are much the same in the two conditions, but they are less grave in cellulitis, and more commonly unilateral. The exudate of peritonitis is more likely to surround the uterus and to fix it in the median position, while the larger inflammatory tumor of parametritis, if confined to one side, will force the uterus to the extreme opposite side. The lateral displacement thereby produced is reversed when the exudate resolves and the uterus is finally drawn by the contracting broad ligament to the opposite side. The exudate of peritonitis is less prominent to vaginal palpation than that of cellulitis.

#### Prognosis.

The prognosis in the acute form, if uncomplicated with tubal disease, is usually good. The inflammation may terminate in speedy resolution. If abscesses form there may be rapid and complete recovery after evacuation of the pus. When pus tubes coexist their removal may be necessary. The chronic atrophic cellulitis of Freund is obstinate for symptomatic and hopeless for histological cure.

#### Treatment.

The reader is especially referred for the treatment of acute parametritis to the prophylactic, palliative, abortive, and surgical treatment of acute metritis. When the disease is secondary to salpingitis the treatment must be directed to the uterine appendages. If the source of the acute infection has been a wound made in a surgical operation or in parturition, let the exposed surfaces be thoroughly cauterized. For this purpose it may be necessary to remove the sutures from a repaired cervix or perineum. Should the source of infection be an infected



endometrium, its removal by sharp curettage may be considered. See page 183. Avoid routine uterine treatment.

*Treatment in Chronic Cases.* When acute symptoms subside let absorption be promoted by the application of Churchill's tincture of iodine to the vaginal fornix and the inguinal regions. The hot water vaginal douche, as described on page 80, is useful. Small doses of calomel, one-twentieth of a grain three times a day, with saline mineral water to secure regularity of the bowels, are strongly indicated. Sitz-baths and hot fomentations are palliative and promote resorption. The formation of pus is a distinct indication for its removal. When suppuration occurs early in the disease the evacuation of the pus is often followed by complete cure. Chronic suppuration indicates tubal disease, and may therefore require the removal of the appendages. An acute pelvic abscess due to cellulitis is usually best opened through the vagina. The pus is easily made out by fluctuation, generally to one side of the uterus. Its presence may be verified by the aspirator needle or by the large hypodermic needle. The needle may then be used as a guide, and the opening enlarged by introducing the sharp-pointed scissors and spreading the blades; after the preliminary incision through the vaginal wall the remainder of the opening may, as described in Chapter XXIII., be made with the finger. The rubber tube or gauze drain may be inserted and the vagina packed with gauze. Should the surgeon evacuate a supposed cellulitis abscess, and the disease prove to have been pyosalpinx instead, no harm has been done, for such accumulations of pus, especially when acute, sometimes yield to the same operation of incision and drainage as advocated above for cellulitis abscess. Later, if necessary, the tube may be removed by abdominal or vaginal section. An opening through the rectum is inaccessible for after-treatment, complicates drainage, favors reinfection of the abscess-cavity, and is therefore to be avoided. In this connection the reader is referred to the treatment of pelvic suppuration by incision and drainage—Chapter XXIII.

Brickell reports numerous cases in which parametritis resulted in the formation of circumscribed serum instead of pus in the cellular tissue. These collections are said to exist occasionally in considerable quantities. Their removal by aseptic aspiration results in radical cure,<sup>1</sup> hence if upon operation the fluid prove to be serum, and not pus, further opening and drainage is unnecessary. Pus, however, may have so far lost its corpuscular elements as to resemble pure serum. A microscopic examination of the fluid, therefore, to settle the diagnosis and the question of drainage might be necessary at the time of the operation.

The treatment of chronic non-suppurative cellulitis, that is, the atrophic variety of Freund, is discouraging. The estimated value of sea-bathing, electricity, glycerin and tannin tamponade, vaginal and rectal douches, and painting with iodine varies widely with different physicians. Personally the author has found such measures unequal to their great promise. The chief reliance must be in local and general massage and in systemic treatment.

<sup>1</sup> Brickell. American Journal of the Medical Sciences, April, 1877.

## CHAPTER XXI.

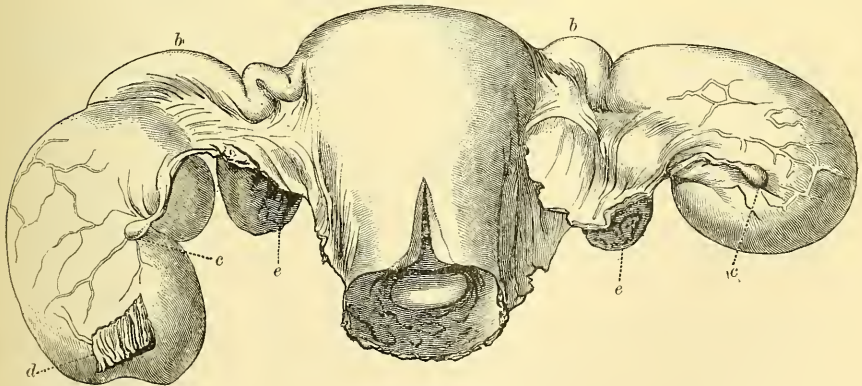
## INFLAMMATION OF THE UTERINE APPENDAGES.—SALPINGITIS, OVARITIS, PELVIC PERITONITIS.

## SALPINGITIS.

No sharp lines of demarcation can be drawn between the inflammations of the different layers of the tube. The anatomical classification, therefore, of endosalpingitis, myosalpingitis, and perisalpingitis is open to the objection which applies to the anatomical classification in metritis. See page 177. Endosalpingitis and perisalpingitis may occur independently of one another. Myosalpingitis is usually a sequence of one or both of the other two forms. The inflammation may be *catarrhal* or *purulent*. The two varieties have many points in common. Either may be acute or chronic.

When the infection has passed through the abdominal opening, infection of the perisalpinx and other adjacent peritoneum occurs. Adhesions then form between the tube and whatever peritoneal surface may be in contact with it. The ovary also may be in the grasp of the fimbriae and so glued to the abdominal opening as completely to close the tube. Both tube and ovary are often rolled up, universally adherent in the posterior fold of the broad ligament. This condition is, however, more common in the suppurative than in the catarrhal variety.

FIGURE 129.

Double hydrosalpinx.<sup>1</sup>

Endosalpingitis, whether catarrhal or suppurative, may extend beyond the tube in three different ways.

1. If the abdominal end of the tube remains open, the secretion may flow out and infect the adjacent peritoneum and the epithelial

<sup>1</sup> Bandl, in American System of Gynecology.

covering of the ovary. The ovarian inflammation is then periovaritis. If, however, there be at the time a freshly ruptured Graafian follicle, the infection may enter the ovary and produce ovaritis.

2. The infection may pass through the walls of the tube by way of the lymph channels and produce perisalpingitis—*i. e.*, inflammation of the peritoneal covering of the tube. This local peritonitis may spread to the pelvic or even to the general peritoneum.

3. The infection may pass through the mesosalpinx into the loose connective tissue between the folds of the broad ligament. Under these conditions perilymphangitis and periphlebitis may occur—*i. e.*, the cellular tissue around the lymph channels and veins may become inflamed. This inflammation is pelvic cellulitis. A discussion of pelvic cellulitis and its relations to salpingitis will be found in Chapter XX.

The second and third modes of extension are more likely to occur if the tube has become distended by pathological secretions, a common result of plastic occlusion of the two ends, or of mechanical closure from swelling. Occlusion from swelling does not continue if recovery takes place; that from adhesive inflammation is usually permanent.

#### Catarrhal Salpingitis.

This is usually the result of the extension of a catarrhal endometritis. It is apt to be confined to the tube, and is essentially an endosalpingitis. The pathology has been discussed under Routes of Infection and under Etiology, pages 215 and 218. The disease itself is much more mild than purulent salpingitis, and is much less likely to result in dangerous extension. The mucosa is thickened, hyperæmic, and infiltrated with round cells. The epithelium is not usually destroyed.

#### Purulent Salpingitis.

Purulent, like catarrhal, inflammation of the tube may be acute or chronic. Much of the pathology has already been described under Etiology and Routes of Infection.

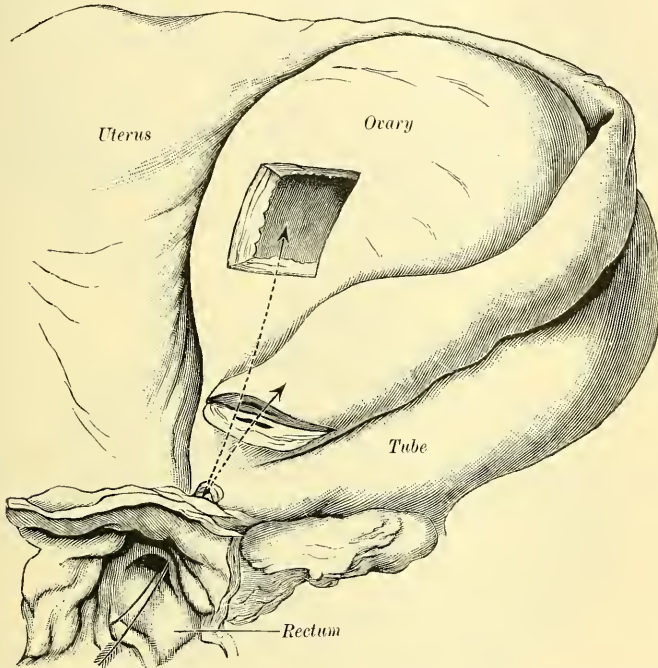
**Pathological Anatomy.** The infection usually involves all three layers of the tube, hence it includes endosalpingitis, myosalpingitis, and perisalpingitis. The extremities of the tube may be closed or remain open. In chronic cases they usually close and pus accumulates in the tube; if they do not close and pus escapes into the peritoneum the result may be fatal peritonitis. Catarrhal inflammation may change to purulent, and, conversely, the contents of a purulent tube may by absorption of the pus cells be changed into a serous fluid.

The germs which produced the disease are much more frequently demonstrable in acute than in chronic salpingitis. In chronic salpingitis it is often impossible to find them. Chronic accumulations of pus in the tubes are usually sterile—*i. e.*, the micro-organisms have disappeared and the pus is no longer infectious. It is said that the bacteria die from the accumulation of their own products. The escape of such sterile pus into the pelvic cavity from ruptured tubes during operation, or from any other cause, is not as dangerous as it was supposed to be when pus was considered always infectious.



From the very beginning of a purulent endosalpingitis the muscular and connective tissues, as a rule, partake of the inflammatory changes. The lymph vessels and bloodvessels of the mucosa become dilated. The epithelium is finally lost, and in its place is a lining of granular tissue incapable of reproducing normal mucosa.

FIGURE 130.



Large pyosalpinx and tubo-ovarian abscess. Tube communicates with abscess in ovary. Tube and ovary both communicate with rectum.<sup>1</sup>

### Sactosalpinx.

When both ends of the tube are closed either by swelling or by adhesive inflammation, and the walls become distended with the accumulated secretions, the disease is called sactosalpinx. Three varieties are distinguished, as follows :

Sactosalpinx serosa—hydrosalpinx.

Sactosalpinx purulenta—pyosalpinx.

Sactosalpinx hæmorrhagica—hæmatosalpinx.

The serous accumulation of catarrhal salpingitis is known as sactosalpinx serosa, or hydrosalpinx. A purulent accumulation is sactosalpinx purulenta, or pyosalpinx. Hæmatosalpinx or sactosalpinx hæmorrhagica is an accumulation of blood in the tube.

Extensive and firm adhesions usually take place between the pus tubes and the adjacent organs, especially the ovaries. Tubo-ovarian

<sup>1</sup> Sutton. Surgical Diseases of the Ovaries and Fallopian Tubes.



abscess or purulent tubo-ovarian cyst may form through such adhesions.

The odor of the pus is often very offensive, and, if the tube be adherent to the rectum, is fecal.

Pus sacs often burst into other adherent organs—rectum, bladder, or vagina. Unlike cellulitis abscess, pyosalpinx does not often burst spontaneously into the vagina. The relief which comes from the rupture of a pus tube into an adjacent organ is apt to be temporary, for the pus usually reaccumulates. The escape of fluid from a hydrosalpinx or pyosalpinx into the uterus will be discussed under Salpingitis Profluens. Hydrosalpinx in one tube and pyosalpinx in the other are not uncommon. Separate compartments, formed by occlusion of a tube at different points, may result in the distention of these compartments with different fluids, hence there may be in the same tube hydrosalpinx, pyosalpinx, and hæmatosalpinx.

FIGURE 131.



Transverse section of a tube and mesosalpinx, in which the latter is infiltrated with inflammatory products secondary to gonorrhœa.<sup>1</sup>

The distended tube often has the form of a pear. Its narrow part toward the isthmus will correspond to the stem; the wide part will be the distended ampulla. In hydrosalpinx the fluid is clear, and in the absence of adhesions to the broad ligament the sac is often found freely movable in the pouch of Douglas.

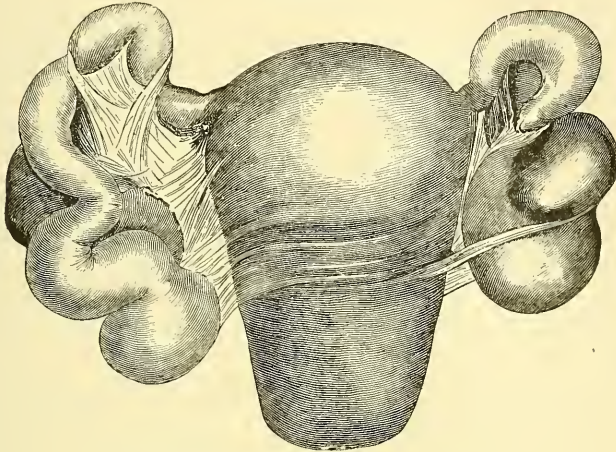
Hæmatosalpinx may occur as the result of a hemorrhagic salpingitis. The sac walls, especially if the hemorrhage be non-inflammatory, as in tubal pregnancy, are very thin and easily ruptured. The blood may or may not be mixed with tubal secretions, and if rupture does not occur may be absorbed.

Admixture of blood may occur in all forms of inflammation. An

<sup>1</sup> Bland Sutton. Surgical Diseases of the Ovaries and Fallopian Tubes.

inflamed tube which contains blood in considerable quantities is designated by the term *hemorrhagic salpingitis* or *hæmatosalpinx*. The latter, however, may occur without inflammation. The blood of

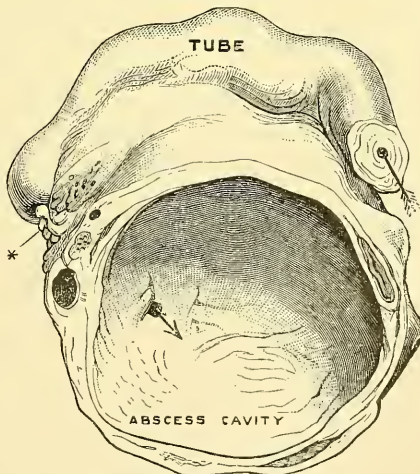
FIGURE 132.



Double pyosalpinx with uterine adhesions.<sup>1</sup>

*hæmatosalpinx* due to tubal pregnancy is always clotted; that due to salpingitis is often quite thick, and may resemble tar, but is never clotted.

FIGURE 133.



Tubo-ovarian abscess.<sup>2</sup>

*Tubo-ovarian Cyst.* A tubo-ovarian cyst may form in the following way: The adhesion of a sactosalpinx to a cystic ovary may be fol-

<sup>1</sup> Bandl, in American System of Gynecology.

<sup>2</sup> From Bland Sutton. Diseases of the Ovaries and Fallopian Tubes.

lowed by the bursting of a small ovarian cyst into the tube and the establishment of a permanent communication between the two. During the further growth of the tubal sac, which is now part of a tubo-ovarian cyst, the ovarian cyst is subject to the same pressure as the walls of the tube; hence the ovarian structure becomes flattened out so as to form a thin wall for the ovarian portion of the composite cyst and the characteristic structure of the ovary is thus lost.<sup>1</sup> This is not to be confounded with ovarian hydrocele. Tubo-ovarian cyst or abscess may occur in connection with either hydrosalpinx or pyosalpinx.

#### SPECIAL VARIETIES OF SALPINGITIS.

**Salpingitis Follicularis.** Sometimes the folds of the swollen mucosa are pressed strongly together, the epithelium disappears, and they grow together. The deeper parts of the inflamed mucosa may in this way be partly or wholly shut off from the lumen and form small cysts. This is called *salpingitis follicularis*,<sup>2</sup> and is not uncommon in catarrhal inflammation.

**Salpingitis Isthmica Nodosa.** In the isthmus salpingitis follicularis is sometimes associated with considerable new formation of connective and muscular tissue, forming small lumps or knots. This local thickening of the uterine end of the isthmus is called *salpingitis isthmica nodosa*,<sup>3</sup> a condition sometimes confused with myoma or adeno-myoma.

**Salpingitis Diffusa.** In chronic cases the whole wall of the tube becomes thickened from diffuse inflammation, *salpingitis diffusa*. The muscular layers and connective tissue are infiltrated with small round cells. Hypertrophy of the muscular layers<sup>4</sup> has been attributed to repeated contractions of the tube set up by the presence of an abnormal amount of fluid. In this way the contents of the tube, unless the abdominal opening has been closed by swelling or by adhesions, may be forced into the peritoneum. In diffuse salpingitis the tube is enlarged, hard, often tortuous, and its swollen congested mucosa is rolled out through the abdominal opening. The secretions may be clear or cloudy, catarrhal or purulent.

**Salpingitis Profluens.** In salpingitis serosa closure by swelling at the abdominal or uterine end is common. The swelling may periodically subside enough to let the confined fluid escape. This is called *salpingitis profluens*. The escape of the fluid is attended with severe colicky pains. The name colica scortorum has also been given to this symptom.

**Salpingitis Vegetans.** In hydrosalpinx the sac walls, if much distended, may become quite thin, although inflammatory thickening may take place proportionately to the growth of the sac. The mucous folds usually atrophy. If the folds survive they become attenuated, and, floating in the fluid, present an appearance described by Sawinoff as *salpingitis vegetans*.<sup>5</sup>

<sup>1</sup> Max Runge. Archiv für Gynäkologie, 1885, p. 1.

<sup>2</sup> August Martin. Die Krankheiten der Eileiter, 1895.

<sup>3</sup> Chiari. Zeitschrift für Heilkunde, 1887. Schauta. Archiv für Gynäkologie, 1888.

<sup>4</sup> Kaltenbach. Centralblatt für Gynäkologie, 1885.

<sup>5</sup> August Martin. Die Krankheiten der Eileiter, 1895, p. 154.



**Tubercular Salpingitis.** The disease is generally secondary to tuberculosis in other organs, and is of frequent occurrence.<sup>1</sup> Whitridge Williams found it in 7.7 per cent. of ninety-one cases of removal of the uterine appendages. It very rarely occurs from direct infection by coitus or otherwise, has been observed as early as the fifth year of life, and is the only form of salpingitis often found in virgins. It usually attacks both tubes and extends to the surrounding parts. Tubercular pelvic disease is characterized by mild pyrexia, weakness, often splenic enlargement, and thickening of the subperitoneal tissues.<sup>2</sup> The tendency of the disease is toward atresia of the tube and the formation of pyosalpinx.

Tubercular salpingitis may be acute or chronic. The abdominal end of the tube is in general open in the acute and closed in the chronic cases; the contents of the tube, if closed, is serous, purulent, or caseous. The mucosa in acute cases may contain many small tubercular nodules. In these nodules are found few giant cells and many tubercle bacilli. Chronic tubercular sactosalpinx is often a large sac with fluid or caseous pus. The mucosa is destroyed and the sac is lined with granular tissue, which contains numerous giant and epithelioid cells. The tubercle bacillus in this tissue is often impossible to find. The perisalpinx presents the same microscopic appearance as the mucosa—that is, there are numerous giant cells and few if any tubercle bacilli. Chronic fibroid tuberculosis<sup>3</sup> of the tubes is a peculiar form described by Williams. In this variety the formation of connective tissue is the final stage of the tubercular infection. The contracting fibrous tissue around the tubercle nodules crushes out the miliary tubercles, and prevents the spread of the disease.

The symptoms, diagnosis, and treatment of salpingitis will be presented in the two following chapters.

## OVARITIS.

**Etiology and Pathology.** Inflammation of the ovary is usually secondary to that of the tubes. It may, however, occur independently of salpingitis by extension from other organs through the lymph channels or veins. It follows from the above that the etiology must be that of the antecedent infection.

Adhesions between the tube and ovary, especially when fresh, contain many lymph vessels; hence bacteria have a short, easy route to the ovary. These adhesions surrounding the whole or parts of the ovary may prevent the normal bursting of the Graafian follicles. The follicles will then become retention cysts. When the inflammation reaches the substance of the ovary from the adhesions on the surface, the ovarian connective tissue may increase and the organ become hard and firm, that is, sclerotic. This again prevents the bursting of the Graafian follicles, and is a frequently unrecognized cause of sterility. Great numbers of follicles may appear ready to burst at the same time. The

<sup>1</sup> Williams. Johns Hopkins Hospital Reports, vol. iii., Nos. 1, 2, and 3.

<sup>2</sup> Edebohls. Gynecological Transactions, 1891, vol. xvi, p. 525.

<sup>3</sup> Williams. Johns Hopkins Hospital Reports, Gynecology, vol. iii.



ovary will then be covered with many small cysts. This has been called microcystic degeneration.

Ovarian abscess may arise in the connective tissue or may be a previously formed cyst infected from a pyosalpinx. See Tubo-ovarian Cyst and Tubo-ovarian Abscess. Tubercular ovaritis is not very common; it occurs usually in connection with tubercular infection of the tubes or peritoneum.

The symptoms, diagnosis, and treatment are deferred to the two following chapters.

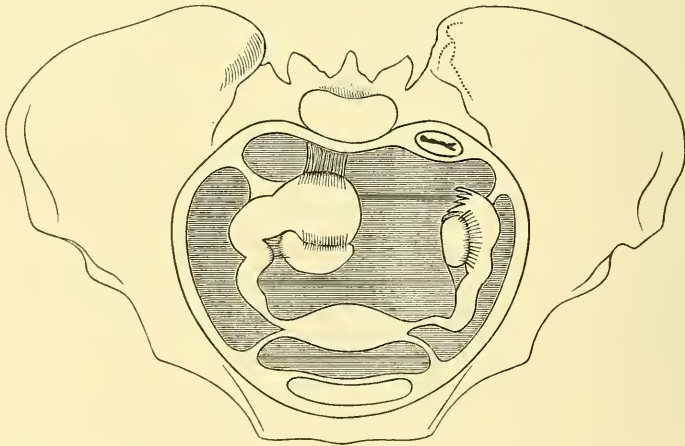
### PELVIC PERITONITIS.

**Pathology.** The two principal forms of peritonitis are:

1. Plastic or adhesive peritonitis. 2. Exudative peritonitis. The two forms usually occur together. The plastic form, however, has been observed with little or no exudate. In addition may be mentioned tubercular peritonitis and pachyperitonitis.

*Plastic or Adhesive Peritonitis.* The formation of adhesions tends to shut off and localize the infection and to prevent it from extending to the general peritoneum; the infection is thereby limited not only in extent and quantity, but its force is spent within narrow limits. Within these limits the process may be very intense and the part may be sacri-

FIGURE 134.



Right and left pyosalpinx. Right, adhesions between ovary and pus tubes and between pus sac and posterior pelvic wall. Schematic.<sup>1</sup>

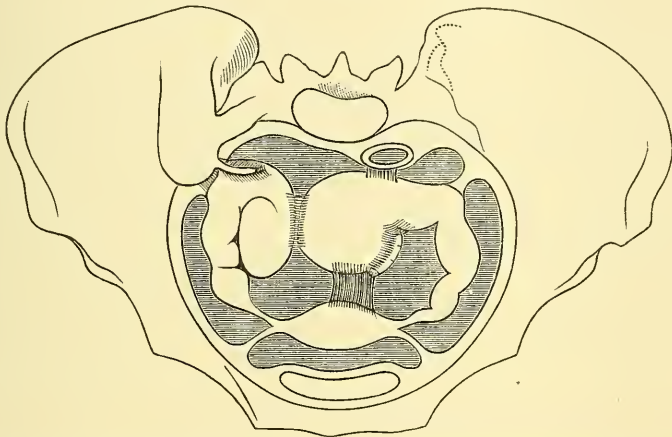
ficed for the benefit of the whole. See remarks on Acute Inflammation and the Significance of Inflammation, pages 147 and 219. The maximum of exudate with the minimum of defensive adhesion is dangerous; conversely, the minimum of exudate with the maximum of adhesion is relatively safe. The adhesions may be slowly broken up by the movc-

<sup>1</sup> Martin. Die Krankheiten der Eileiter.

ments of the intestines and by absorption, or they may become firm and permanent; hence the organs may be strongly matted together, with resultant displacements, stenosis, strictures, occlusion, and kinking; peristalsis is then impeded, and nutrition suffers.

There may be at different points accumulations of pus walled off from the general peritoneum by adherent intestines and other viscera. If the peritonitis becomes general it is usually fatal. The strong tendency, however, is to protect the general peritoneum by adhesions between the peritoneal surfaces around the inflamed area, and thereby to limit the disease. See page 130.

FIGURE 135.



Right and left pus tubes adherent to one another. Right tube adherent to vermiform appendix. Left tube adherent to uterus and rectum. Schematic.<sup>1</sup>

Pelvic peritonitis usually begins with perimetritis or perisalpingitis, the infection having reached the peritoneum from the uterine or tubal mucosa. In some cases its origin is extra-pelvic. In that case the uterus and its appendages may not be involved. The disease, especially in connection with gonorrhœal salpingitis, is very common. The frequent recurrence of acute local exacerbations furnishes a familiar indication for the removal of the uterus and its appendages.

The exudate following infection of the peritoneum may be serous or purulent; it may or may not be mixed with blood. The protective adhesions often include numerous partitions through the infected parts; hence several distinct collections of fluid may be formed. These collections are sometimes serous in one part, purulent in another; the whole may form a large tumor filling the pelvis and lower part of the abdomen, having the appearance and many of the physical signs of an ovarian cyst.

The fluid may be absorbed or it may break into a neighboring organ. In this way communications may be formed between the pelvic cavity

<sup>1</sup> Martin. Die Krankheiten der Eileiter.

and the bowel, bladder, or vagina. Sometimes the pus finds its way to the cutaneous surface. These accumulations are most frequent in the pouch of Douglas. The microscopic findings show a few round cells in the serous, numerous pus cells with a few red blood-corpuscles in the purulent, and numerous white and red blood-corpuscles in the hemorrhagic collections.

*Exudative Peritonitis* is the result of an infection which does not strongly tend to provoke defensive action, and is, therefore, more liable than the plastic variety to become general; for this reason it is often more dangerous.

*Tubercular Peritonitis* is of frequent occurrence, and is usually characterized by small, sometimes minute pearly tubercles or points scattered over the peritoneum; it is commonly associated with more or less ascites.

*Pachyperitonitis*. Oftentimes the peritoneum is much thickened and supplemented by the formation of new membrane upon its surface which give it a leathery appearance. The vessels in this new membrane early rupture with circumscribed hemorrhage. This is called *pachyperitonitis*.

The symptoms, diagnosis, prognosis, and treatment may be found in the two following chapters.

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## CHAPTER XXII.

### SYMPTOMS, DIAGNOSIS, AND PROGNOSIS OF SALPINGITIS, OVARITIS, AND PELVIC PERITONITIS.

OVARITIS and pelvic peritonitis, although in a sense separate diseases, are usually so closely related to salpingitis that their symptoms, diagnosis, prognosis, and treatment are largely included in those of salpingitis. For convenience, and to avoid repetition, therefore, the symptoms, diagnosis, prognosis, and treatment of these infections will be presented together. Inflammation of these organs, taken as a whole, is sometimes designated as adnexal inflammation or inflammation of the uterine appendages.

#### Symptoms.

The symptoms of inflammation of the uterine appendages, including the pelvic peritoneum, vary with the extent, virulence, acuteness, and mechanical conditions of the disease. Usually the tubes are less sensitive to pain than the uterus and ovaries. The milder catarrhal inflammations, even though acute, may cause symptoms so slight as scarcely to fix the patient's attention upon the diseased part; they may even run their course and disappear, leaving no trace except, perhaps, greater liability to future infection. Such unrecognized, mild, conges-

tive and catarrhal attacks of salpingitis are probably more frequent than is generally supposed.

Local pain or discomfort in the affected part does not always correspond to the seriousness of the infection. There may be only a dull aching, or a sensation of burning not sufficient to impress the patient seriously unless aggravated by local pressure, by vaginal examination, by exertion, or by defecation, and yet the tube may be distended, ready to burst and discharge its poisonous contents into the peritoneal cavity. The pain of salpingitis is always much increased when the disease includes peritonitis and ovaritis.

A small minority of cases is characterized from the beginning of the attack by very acute colicky pains in the region of the tubes, with intervals of comparative comfort. This symptom, from its frequency in prostitutes, has been called *colica scortorum*. Its mechanism has been explained by the supposition of tubal spasm due to the irritating presence of the confined fluid, just as fluid confined in the uterus may cause painful uterine contractions. The spasmodic pain may also be caused by the irritated or inflamed peritoneum around the diseased tube<sup>1</sup> or by a distended bowel; Schauta considers it characteristic of *salpingitis isthmica nodosa*.

The spasmodic pain of salpingitis profluens, already described on page 322, has also been explained on the supposition of painful contraction of the muscular walls of the tube and uterus. It is probable, however, that wide distention of the tube would so paralyze the muscular layer that it could not contract. The pain, therefore, as in the condition described in the foregoing paragraph, may also be due to peritoneal irritation.

During the monthly period the pathological congestion is supplemented by that of menstruation, hence the pains are increased, and dysmenorrhœa is the rule. Increased menstrual flow, even to the extent of menorrhagia, is common. Amenorrhœa or scanty menstruation is seldom observed, but when present points to possible tuberculosis.

Greatly dilated and swollen tubes, especially when associated with local peritonitis, always produce mechanical disturbances. This is more marked when the swelling has been rapid. The more gradual the swelling the more opportunity the parts have to adapt themselves to the new conditions. The mechanical symptoms are variable and numerous. They include painful urination and defecation, difficulty and pain on walking and standing, pelvic neuralgia, and many reflex symptoms referable to the cerebro-spinal and digestive systems.

*Peritonitis* is a very common result of inflammation of the uterine appendages. Its symptoms in the acute stage vary irregularly with its extent and virulence. They may be slight or absent, or may include great pain, nausea, fever, abdominal distention, retraction of the thighs, anxious facies, and great nervous depression. The greater the tendency of the peritonitis to become general the more aggravated will be the symptoms. The symptoms, however, are sometimes altogether disproportionate to the gravity of the infection. Suppura-

<sup>1</sup> A. Martin. Die Krankheiten der Eileiter, p. 104.



tive salpingitis, especially rupture of a pus tube, is most likely to cause dangerous peritonitis. The greatest discomfort, pain, and disturbance of function in the pelvis, especially about the rectum, uterus, and bladder, may come from mechanical causes, such as tension on bands of adhesion and pressure and traction upon the inflamed peritoneum.

Sterility is explained by the hostile influence of the secretions of the inflamed tube upon the impregnated ovum or spermatozoa; or, if the tube has closed, by the mechanical interruption of their passage through it; or by the failure of the Graafian follicle to rupture through the thickened, tough, chronically inflamed ovarian cortex.

*The Symptoms of Acute Ovaritis* are usually confounded with those of the antecedent inflammation in the neighboring organs. If the ovary can be distinguished by conjoined examination from these organs, it will be felt as a tender mass, the seat of heavy, burning, severe pain in the right or left inguinal region. Pain on pressure will usually be associated with nausea, and will radiate down the thighs and over the abdomen. There will often be pain in the breasts, and always more or less fever. When these symptoms predominate over all others, acute ovaritis may be inferred. The sickening sensation, especially on pressure, not unlike that from pressure on the testicle, and the presence of pain shooting down the thighs are characteristic of ovaritis. Acute ovaritis may, however, give little or no discomfort.

*Chronic Ovaritis*, like the acute, is also usually associated with disease of the tubes and peritoneum. It may survive and continue alone after the causative inflammation in those organs has disappeared. The symptoms include menstrual disorders and a wide range of pains and discomforts. The pains are frequently referred to distant parts, notably the navel, breasts, and lumbar region. The chronically congested or inflamed ovary is often prolapsed to the pouch of Douglas, where the distressing mechanical effects of pressure during defecation, micturition, coitus, and exercise are very pronounced. Dyspareunia is the rule. The spinal and sympathetic nervous plexuses in the pelvis are subject to great irritation; hence a great variety of reflex nervous influences. Among the numerous symptoms more or less common are indigestion, malnutrition, pelvic and extra-pelvic neuralgia, hysteria, inability to walk, and other motor disturbances. The reader will know from the above that ovaritis is usually only one of the clinical features of a more or less general pelvic inflammation.

#### Diagnosis.

The symptoms outlined in the foregoing paragraph point to the probability of inflammation around the uterus. Indeed, it is usually easy to recognize the presence of acute pelvic inflammation, especially when the pelvic cavity is crowded with inflamed organs and the products of inflammation. The physical examination, however necessary to verify the diagnosis, will frequently not only fail to establish sharp diagnostic lines between inflammations of the different pelvic organs, but also between pelvic inflammation and other morbid conditions, such as tumors, with which the inflammatory mass may be con-

fused. The subjective symptoms in the milder cases may be wholly overlooked. Indeed, the existence even of pyosalpinx is sometimes unrecognized until rupture of the tube and the escape of pus have set up a dangerous peritonitis. The presence of endometritis even should place one on guard against possible salpingitis.

In order to avoid the rupture of a pus tube or abscess wall great care in the palpation of uterine appendages is imperative.

There is usually a recent or remote antecedent background of acute or chronic infection in some neighboring organ; the diagnosis, therefore, should include both the inflamed appendages and the antecedent causative inflammation, usually endometritis, but sometimes vaginitis, vulvitis, cystitis, proctitis, or appendicitis.

Among the subjective symptoms will be dull, often burning, constant, remittent, or intermittent pain and local tenderness. The colicky pains about the tubes already mentioned under symptoms are strongly diagnostic. Occasional exacerbations of local peritonitis from leakage of the tube or from other sources are characteristic of adnexal inflammation. In order to establish the diagnosis, the symptoms already outlined must be supplemented by physical examination.

*Physical Examination* is by external palpation and conjoined manipulation. The former is usually inadequate. The latter, which includes external palpation, is made with the left index-finger in the vagina and the right hand over the hypogastrium or, as set forth on page 57, with the left index-finger in the rectum, the thumb in the vagina, and the right hand over the hypogastrium. Light, conjoined palpation will show an irregular elongated swelling on one or both sides of the uterus, frequently extending into the pouch of Douglas, or even sometimes in front of the uterus. It is often impossible to make out the component parts of such a mass. They will, however, usually include the inflamed tube or tubes together, in varying degree, with diseased ovaries, peritoneum, intestine, omentum, bladder, and uterus. These structures may be matted together in an irregular, indefinite tumor. The one nearly constant factor in such a mass is salpingitis.

Adnexal disease often occurs only on one side, more frequently on the left than on the right, and very frequently on both sides. The principal affections with which it may be confused are:

Tumors of the uterus, tubes, broad ligaments, intestines, sacrum, and ilium.

Appendicitis.

Intestinal adhesions.

Fecal accumulations.

Extra-uterine pregnancy.

Uterine displacements.

Parametritis.

Hæmatoma.

Myomata developing from the lateral walls of the uterus between the folds of the broad ligaments in location and form may simulate sactosalpinx; but, unlike sactosalpinx, they are hard, more closely incorporated with the uterus, cause more uterine enlargement, are more apt to set up menorrhagia, develop more gradually, produce more

pressure symptoms, are usually painless, and lack the history of inflammation.

Neoplasms of the tubes and broad ligaments are less painful, of slower growth, and more free from adhesions than adnexal inflammatory tumors. They also give no history of inflammation.

Tumors of the intestines, especially if adherent to the appendages, may be very difficult to distinguish from adnexal inflammation. The bowels should be thoroughly moved before the diagnosis is attempted. If not adherent the mass will be easily separated from the pelvic organs; if there be adhesions an exploratory incision may be necessary.

Ovarian tumors, if small and adherent, are sometimes indistinguishable from sactosalpinx except by exploratory incision. They are usually of more globular shape, while sactosalpinx is oblong or of kidney shape. They are also less closely connected with the uterus. The large ovarian tumors will be excluded by their size. Tubo-ovarian cyst, described on pages 231 and 232, will usually be recognized only after exploratory incision.

Accurate and adequate diagnosis<sup>1</sup> between the various forms of sactosalpinx and certain ovarian neoplasms is difficult. These neoplasms are, 1, small ovarian or parovarian cysts; 2, small, solid ovarian tumors; 3, small ovarian dermoids. The diagnosis, when possible, is made by finding the tube and tracing it to the uterus. When small cysts are impacted in the pelvis and their shape distorted, differentiation, save by an exploratory incision, may be impossible. A distended tube felt above the pelvic brim is easily confounded with ovarian cystoma. The frequent coexistence of these small tumors with sactosalpinx may render the diagnosis without exploratory incision impossible. Tumors of the sacrum or ilium are distinguished by their location, hardness, immobility, and by their close relations with the bony pelvis. Malignant disease of the cæcum, or sigmoid flexure, or uterine appendages, simulating adnexal inflammation, may be diagnosed by the clinical history, by palpation, or by exploratory incision.

The physical examination and the clinical history will usually serve to distinguish appendicitis, intestinal adhesions, and intestinal obstruction from pelvic inflammation. A loop of intestine adherent to the tube or broad ligament may decidedly obscure the diagnosis.

Fecal accumulations are found by palpation and removed by cathartics.

Extra-uterine pregnancy is usually in the tube, and is therefore difficult to differentiate from inflammatory sactosalpinx. Its history is that of modified pregnancy. The progress is more uniform and the liability to tubal rupture is greater. Enlargement of both tubes would usually exclude it, although there might be sactosalpinx on one side and tubal pregnancy on the other.

Uterine flexions and versions may lead to confusion. It is often difficult to distinguish between the displaced corpus uteri and an inflammatory swelling close to the uterus. Conjoined examination and the sound will usually demonstrate the real condition.

<sup>1</sup> Bland Sutton. *Surgical Diseases of the Ovaries and Fallopian Tubes*, pp. 296 and 298.



The diagnosis of parametritis and its relation to adnexal disease have been discussed under that subject.

Pelvic hæmatocele from rupture of a tubal gestation sac or from any other cause occurs suddenly, with excruciating pain and symptoms of hemorrhage and without evidence of inflammation. Later, infection may be set up in the hæmatocele cavity, and a pelvic abscess may take the place of the hæmatoma. Its physical signs will then be like those of an abscess from other causes.

The differentiation of the various adnexal inflammations from one another, especially in their acute stage, is often difficult. Ovaritis, usually a consequence, sometimes a cause of salpingitis, is not easily distinguished from it when the two organs are fused together by adhesions. When the tube is distended with fluid the difficulty is increased.

The distinction between hydrosalpinx and pyosalpinx is sometimes impossible. The diagnostic points are as follows :

<i>Hydrosalpinx.</i>	<i>Pyosalpinx.</i>
1. Systemic disturbance relatively slight.	1. Systemic infection often marked from absorption of pus.
2. Less fever and pain and adhesions.	2. More fever and pain and adhesions.
3. Bursting of the tube and discharge of its contents into the abdomen may give relief.	3. Bursting of the tube and discharge of its contents may cause dangerous peritonitis.
4. Walls of tube distended, thin, smooth, elastic, and fluctuating.	4. Walls of tube, thick, hard, sometimes stony, resistant, nodular, less elastic, and less fluctuating.
5. More usually associated with catarrhal endometritis.	5. More usually associated with purulent endometritis.
6. Thin, overstretched tubal wall easily ruptured.	6. Walls usually not so easily ruptured.

*Exceptions.* Sometimes the pyosalpinx wall is thin and necrosed in places ; at other times, when the distention has been rapid, it may be thin throughout, and therefore quite as easily ruptured as in hydrosalpinx. On the other hand, the contents of pyosalpinx, with its thick, tough walls, may by absorption of the corpuscular elements of the pus be changed to a serous fluid, making a modified hydrosalpinx. Such a tube would not be so easily ruptured.

The diagnosis between hydrosalpinx and hæmatosalpinx is as follows :

<i>Hydrosalpinx.</i>	<i>Hæmatosalpinx.</i>
1. Wall smooth and more elastic.	1. Wall smooth and less elastic.
2. Slower development.	2. Sudden development.
3. Rupture may give relief.	3. Rupture may cause dangerous hemorrhage.

In rare cases the displaced kidney, spleen, and other abdominal viscera may simulate adnexal disease.

The distinction of one form of bacterial infection from another must depend upon the bacterial examination of the secretions. This is always desirable, but sometimes impracticable. The vulvo-vaginal and uterine secretions in the acute stage usually contain the causative germs. Pus long confined in the tube is apt to become sterile. This explains the freedom from infection so often observed after a pus tube has ruptured within the peritoneal cavity during its removal. The inflammation may continue long after the original germs have disappeared, or at least after their presence can no longer be demonstrated.



*Anæsthesia* is often necessary in order to make a satisfactory diagnosis and differential diagnosis of adnexal inflammation, and should be used in cases of doubt. Relaxation of the abdominal muscles under anæsthesia permits more efficient palpation with the minimum force, and consequently with the minimum risk. Many unnecessary laparotomies would doubtless be avoided by more careful diagnosis under anæsthesia. The more or less distended bladder or bowel has often been mistaken for a pathological collection of serum, blood, or pus; hence evacuation of the bladder and rectum is prerequisite to examination.

*Exploratory Incision.* In serious pelvic disease the diagnosis, if not possible or satisfactory by the above means, may be made by exploratory vaginal or abdominal section. The incision may be the first step of a radical operation or, if the operation prove unnecessary, it may be safely closed. It is a good rule always to begin a peritoneal operation as a diagnostic exploratory incision. Mr. Tait wisely remarks, "It is better to turn an exploratory incision into an operation than it is to turn an operation into an exploratory incision." The late Charles T. Parkes, whose early loss will not soon be replaced, when questioned by a bystander at the beginning of an abdominal section, replied, "I don't know what it is, and I am tired of guessing."

#### Prognosis.

In acute adnexal inflammation the prognosis varies with the nature of the infection and with the extent of the disease. If the tube ruptures and discharges pus into the peritoneum a fatal peritonitis may follow. If the infection is confined to the tube the prognosis is usually favorable, but the removal of the appendages may be necessary for permanent recovery.

Simple catarrhal salpingitis and mild ovaritis may run their courses, perchance unrecognized, to recovery. They may even leave no trace behind them save an increased liability to further inflammation. The more chronic the disease the less favorable the outlook for expectant treatment. Sactosalpinx, especially the purulent variety, rarely recovers without operative interference. This rule, however, is not without exception. Pus cavities may rupture spontaneously and discharge their contents through the bowel, uterus, bladder, vagina, or cutaneous surface, and recovery may follow. But such a possibility does not offer substantial hope of relief. In fact, even when such rupture and discharge are followed by relief, the result is usually only temporary, and the patient may succumb to repeated infection.

Serous sactosalpinx, although less dangerous to life, may, by permanent closure of the tubes, cause loss of function and, if the disease is bilateral, sterility. Purulent sactosalpinx is a constant danger even to life. The gonococcus is less perilous to life, though probably more dangerous to health than the streptococcus. The streptococcus is apt to destroy the woman, while the gonococcus in a physiological sense destroys the reproductive organs and makes a chronic invalid.

The danger of operation varies somewhat with extent of the disease, but chiefly with the kind of operation, the operator, and the nature of

the causal bacteria. The mortality of some operators is enormous; that of others gives almost 100 per cent. of recoveries. The removal of a gonococcus sactosalpinx is less dangerous than that of a streptococcus sactosalpinx. This is especially true if the sac ruptures into the peritoneum.

One hundred and forty-four cases of removal of sterile pus tubes show a mortality of 2.8 per cent.<sup>1</sup> The average mortality, among the best operators, of the removal of pus tubes is from 2 to 3 per cent. The operations in sixteen cases of gonococcus sactosalpinx in which the sac was removed intact show a mortality of 6.2 per cent.; in seventeen cases in which it burst during its removal the mortality rises to 11.7 per cent. In another similar series the mortality was 8.35 per cent. and 11.1 per cent. respectively.<sup>2</sup>

It is evident from the above that the prognosis of the operation is favorably affected by the removal of the appendages without rupture and escape of pus into the pelvic cavity. The average mortality, however, with modern asepsis and technique is small except for the streptococcus cases, and these fortunately are not very numerous.

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## CHAPTER XXIII.

### TREATMENT OF SALPINGITIS, OVARITIS, AND PELVIC PERITONITIS.

THE treatment of inflammation of the uterine appendages is non-surgical and surgical.

#### Non-surgical Treatment.

The treatment of the milder adnexal inflammation, when early recognized, is largely the same as that of the causative endometritis. Quiet, frequent rest, judicious, active and passive exercise, avoidance of sexual excitement, regulation of the bowels, nutritious and non-stimulating diet, and the prohibition of tea and coffee in neurotic cases, are among the routine measures. Repeated examinations and treatments, especially rough palpation of a sactosalpinx, may, as stated under diagnosis, prove dangerous.

**Medical Treatment.** In acute cases pain may be relieved by opium or its derivatives, but they mask the symptoms, check the secretions, and are therefore to that extent contraindicated. The occasional practice of locking up the bowels and preventing peristalsis by the free use of opium has been largely abandoned. On the contrary, rather active elimination through the bowels and kidney has

<sup>1</sup> Schauta. *Centralblatt für Gynäkologie*, 1893, p. 502.

<sup>2</sup> A. Martin. *Die Krankheiten der Eileiter*, 1895, p. 333.

become the more accepted practice ; hence non-constipating palliatives are usually substituted for opium. Of these, the coal-tar derivatives, chloral hydrate, hyoseyamus, and bromide of sodium are among the more useful and least objectionable. The phosphate of codeia repeated in half-grain doses is the least injurious of the preparations of opium. Should the nervous symptoms predominate and demand the more dependable morphine, its constipating effect may be overcome by the addition of an equal amount of podophyllin.

Elimination is often well secured by means of rectal enemata containing sulphate of magnesia, glycerin, or spirits of turpentine, as described in Chapter VIII., or, if positive purging be required, by the use of some active cathartic. One may use to advantage repeated doses of calomel, one-half grain in each, followed by Rochelle salts, solution of citrate of magnesia, or some other appropriate saline. The calomel itself is both cathartic and diuretic. When the stomach will not tolerate ordinary cathartics, a grain of calomel may be put upon the tongue every hour until the bowels act. A very high, retained enema of four ounces of the saturated solution of sulphate of magnesia often gives prompt relief.

There is a form of chronic bilateral adnexal disease which scarcely goes beyond irritation and congestion. This is referred subjectively to the region of the ovaries. It is quite common among nervous, overwrought spinsters and girls, is usually associated with nervous irritability, is sometimes transient, often intractable, seldom dangerous.

Overwork and over-excitement from study or social requirements, and especially music,<sup>1</sup> by the physical strain of practice and by the power of music to excite the emotions at the developmental period of puberty, are potent and, among the higher classes, common causes of ovarian irritation. Many a neurotic hopeless invalid in mature life may date her invalidism from such mental and emotional strains at the time of puberty.

The treatment of the somewhat intangible irritation outlined above is mainly hygienic and moral, and largely, therefore, belongs to internal medicine. It should, however, be rather regulative than medicinal. Unsatisfied sexual requirements, conscious or unconscious, demand that the attention be drawn away from the reproductive organs. If the patient has reached the proper age marriage may be indicated. Otherwise let there be a change of environment and promotion of new interests. A careful, all-around examination may show some causal and removable extra-pelvic fault in the patient or her environment. There will often be found disturbance of the heart, liver, or kidney, or intestinal indigestion ; such disorders may explain the impeded circulation upon which the ovarian irritation largely depends. There is usually an associated mild endometritis, which yields, if at all, to systemic treatment. The useless sacrifice of countless ovaries in this class of cases is a reproach to surgery. Menorrhagia, a frequent result of this condition, is well treated by ergot, preferably given in rectal suppositories, five to ten grains every eight hours until the flow is controlled.

<sup>1</sup> Lawson Tait. Diseases of the Ovaries, p. 90, 1883.



Skene recommends for menorrhagic and neurotic cases the continued use of the fluid extract of hydrastis in thirty-drop doses, and, as needed for nervousness and sleeplessness, twenty to thirty grains of bromide of sodium, to be given well diluted at bedtime, and repeated if necessary.<sup>1</sup>

The medical treatment not only of the above form of ovarian irritation, but of chronic adnexal inflammation in general, includes the judicious use of tonics, laxatives, alteratives, and hypnotics. It must conform to the general principles of internal medicine, and differs in no essential point from the general treatment of the extra-pelvic inflammations.

**Local Treatment.** Reposition and retention by mechanical support of the displaced uterus may open up the collapsed uterine or tubal canal, secure drainage of the retained secretions, and, by overcoming traction on the bloodvessels, may relieve congestion. The prime indication to restore the balance of the circulation is often fulfilled by a pessary. Special attention, however, is directed to its contraindications, as laid down in Chapter XLVII.

Catheterization, probing, and direct treatment of the Fallopian tubes through the uterus may, perhaps, when they are dilated by disease, be possible, and have been proposed, but they are useless and dangerous procedures.

Cold-water coils or the rubber ice-bag to the abdomen, the application of a large blister to that part of the hypogastrium over the seat of maximum pain, and the free use of leeches are very serviceable, especially in the abortive treatment of acute cases. At least eight leeches should be applied: one or two are useless.

The local treatment of chronic adnexal inflammation has for its chief object the quickening of the pelvic circulation and the promotion of absorption of morbid products. It includes, 1, the hot-water vaginal douche; 2, the vaginal tamponade of lamb's wool saturated with glycerin or glycerin and ichthyol; 3, the hot hip-pack; 4, electricity; 5, massage.

*The hot-water vaginal douche and the wool vaginal tamponade* are described in Chapter IV.

*The hot hip-pack* is a most efficient form of hydrotherapy. Its application is as follows: Let an ordinary sheet be folded lengthwise into several thicknesses, so that its width will reach from the umbilicus to the middle of the thighs. Let this be rolled into a roller bandage, dipped in very hot water, and wrung as nearly dry as possible, preferably by a clothes-wringer. Pass this as a bandage several times around the pelvis, so as to envelop the zone from the umbilicus to the middle of the thighs. Cover it with a dry sheet and let the patient lie in it for thirty minutes. It is well, in order to retain the heat as long as possible, to place between the wet and dry sheet a rubber sheet or a rubber bag of hot water. The pack should be repeated daily, or twice daily, according to the tolerance of the patient. An occasional objection to its use is its tendency to cause profuse menstruation. The treatment is a most efficient means of stimulating the

<sup>1</sup> Medical Gynecology, p. 230.



pelvic circulation, and thereby of promoting absorption of morbid products. Chronic constipation, pelvic pain, dysmenorrhœa, and other functional disturbances often give way promptly under its influence. Under this treatment the disorder may lapse into subacute ovaritis with sometimes constant, sometimes remittent symptoms.

*Electricity.* The galvanic electrode, even with light dosage, has caused extensive destruction and cicatricial contraction in the genital tract, especially in the upper part of the vagina. The intra-uterine electrode is painful and often intolerable. The occasional dangerous infection following its use is proverbial. The Faradic current is used as a form of deep local massage, and the galvanic for its supposed resolvent effects. Both are said to promote absorption. The electrical treatment of pelvic inflammation in the author's hands, after a long and faithful trial, has proved itself in safety and efficiency unequal to the promise of its devotees.

*Pelvic Massage* for chronic inflammation around the uterus, a treatment developed by Thure Brandt, stands at the head of the non-operative local measures. The massage is indicated for, 1, the removal of inflammatory exudates; 2, the breaking up and stretching of adhesions; 3, the restoration of function to contracted or overstretched ligaments; 4, the reposition of displaced organs. The possible dangers of massage are very great; hence the imperative necessity of a most careful study in every case of the two urgent contraindications—acute inflammation and the presence of pus. The value of massage is so great that a special chapter will be given to it—Chapter L.

The modes of treatment above outlined may be indicated in connection with surgical treatment: for example, vaginal aspiration of the hydrosalpinx, followed by efficient local massage and by such systemic treatment as would improve the patient's resistance to infection, may result in cure.

#### Surgical Treatment.

When the disease has progressed to permanent obstruction of the tube and the formation of pyosalpinx, without periodical discharges of pus through the uterus, and especially when the occasional attack of local peritonitis proves that the infection is not constantly confined to the tubes, the above-described treatment is no longer conservative; its continuance may be even more dangerous than the most pronounced operative measure. A time has come when a radical operation, even to the removal of the diseased organs, may be less dangerous than the disease, and, relatively speaking, therefore, becomes the conservative procedure. The inflamed tube, enlarged to the size of the finger,<sup>1</sup> will seldom return to its normal state and functions. If, together with this condition, there be evidence of suppuration or great local irritation, the indication for operation is clear.

For the preparatory treatment, see Chapter II.

The operative treatment of acute pelvic inflammation does not differ materially from that of the chronic. It, however, more frequently requires the vaginal than the abdominal section.

<sup>1</sup> Schauta. Centralblatt für Gynäkologie, 1893, p. 502.

The removal of the Fallopian tube alone is called salpingectomy; that of the ovary alone is called oöphorectomy. When tube and ovary are removed together the operation is designated as oöphoro-salpingectomy, or salpingo-oöphorectomy. Usage reserves the word ovariectomy to signify the removal of an ovarian tumor.

**Routes of Operation.** There are two recognized routes for the operative treatment of the inflamed uterine appendages, the abdominal and the vaginal. An operation by the abdominal route necessitates abdominal section, also called cœliotomy or laparotomy. An operation by the vaginal route involves vaginal section. It is often necessary to combine abdominal and vaginal section in one operation.

#### ABDOMINAL SECTION.

The reader is referred to Chapter V., on General Principles of Major Operations, for preparatory medical treatment, the technique of the abdominal incision, and the general conduct of the operation. It is often necessary to add to this operation a vaginal section, hence the importance of making in the vagina and about the vulva the same aseptic preparations as would be made if vaginal section were planned from the beginning.

Sometimes the inflammatory exudate has extended through the peritoneum to the subperitoneal structures, and so disorganized and disguised the parts as to render them difficult of recognition. Under these conditions careful dissection is necessary, in opening the abdomen, to avoid the unfortunate accident of opening directly through the thickened, leathery peritoneum into an adherent bladder or intestine.

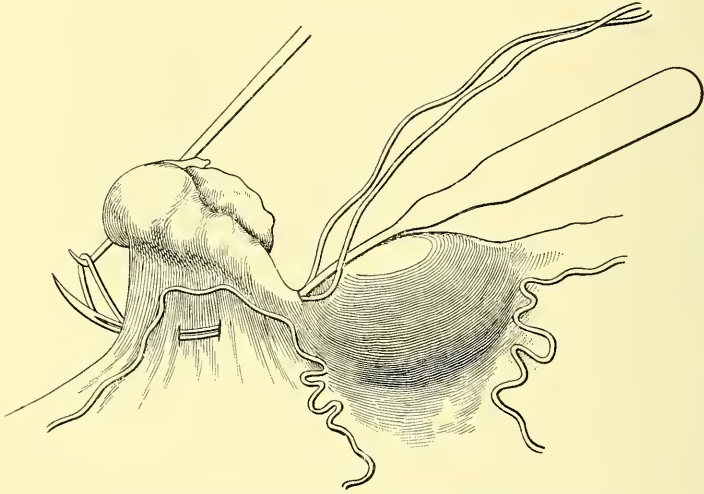
If adherent omentum is in the way, it may be separated gently with the sponge, that is, sponged off from its attachments. If not adherent it may be pushed aside. Any bleeding-points should be secured by fine catgut ligatures, torsion, or temporary forcipressure.

If the case be simple, with no adhesions, or if the adhesions be few and easily broken, the operation will be relatively simple. The index-finger of the left hand finds the fundus and posterior wall of the uterus, and then maps out the diseased areas in that region. The finger, starting from the posterior wall of the uterus, sweeps along the posterior fold of the broad ligaments on either side and examines the Fallopian tubes and ovaries. These organs, now accessible to sight and touch, may be subjected to any necessary operation or manipulation. See Trendelenburg Position, page 106. The incision, if too short, may be lengthened. The intestines are pushed upward and isolated by flat gauze or sea sponges. If there are no adhesions the appendages may be lifted gently up into the wound and examined. The surrounding exposed parts should be protected by gauze sponges. If the removal of the appendage is necessary the operation will be as follows:

The tube with its mesosalpinx and the ovary are grasped firmly in the left hand and drawn up into the abdominal incision. The other hand passes the pedicle-needle containing the ligature through the broad ligament well under the appendages, close to the uterus, including

even a loop of the round ligament. This round-ligament loop is readily seen on the anterior surface of the broad ligament. In order that the entire tube may be included in the ligature, the needle should transfix the uterine end of the broad ligament at its uterine junction, even passing through the horn of the uterus. The pedicle-needle, entering at this point, is made to transfix the broad ligament quite under the appendages at two or three points from side to side. This will be a protection against the slipping off of the ligature. The ligature, thus passed, may now be tied, according to the operator's preference, in the ordinary figure-of-eight form or by the Staffordshire knot.

FIGURE 136.



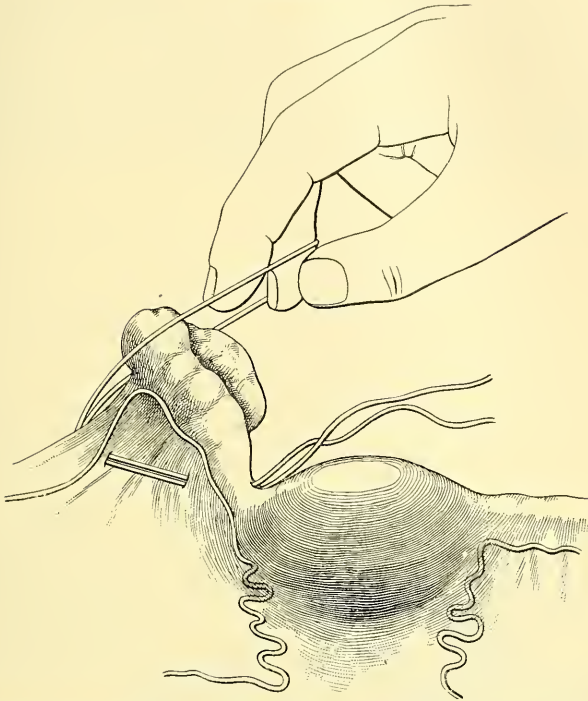
Showing transfixion of broad ligament with Peaslee's needle.

The *Figure-of-eight Ligature* requires the loop to be cut so that two separate parallel threads shall pass through the broad ligament side by side. The threads having been crossed are tied one on each side. The hæmostasis is then reinforced by passing the threads on one side entirely around the stump in the ligature groove, and again tying *en masse*. If silk is used the ordinary hard knot is sufficient. Catgut, unless properly tied, makes an unreliable knot. To tie the gut so that even under tension it will remain tied, a double turn or hitch is first made and then drawn tight; a single turn is then made and drawn tight. The knot is then completed by another double turn.

The *Staffordshire Knot* was first used by Lawson Tait. The ligature is passed with the pedicle-needle, as described in the foregoing paragraph, and the needle is withdrawn so as to leave the loop on the further side of the stump. Figure 136. The loop is then drawn over the tumor or mass to be removed, Figure 137, and one of the free ends drawn through it so that one free end is under and the other over the retracted loop. Figure 138. Both free ends, being seized by the right hand, are drawn tightly through the pedicle; at the same time the thumb and forefinger of the left hand grasp the ligature where the

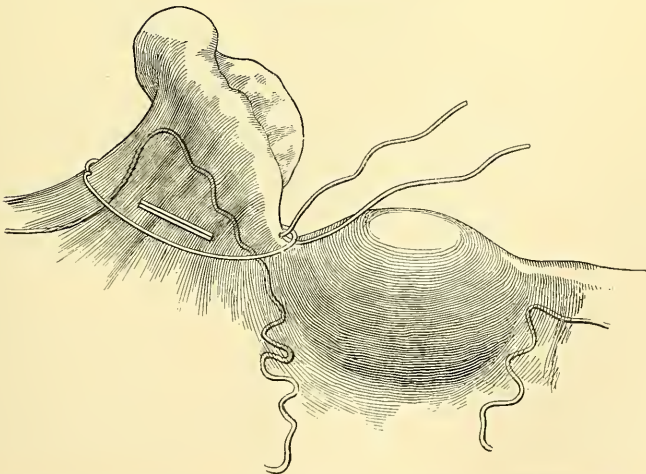


FIGURE 137.



Ligature passed and needle withdrawn. Ligature ready to be tied either by the ordinary figure-of-eight method or by the Staffordshire knot.

FIGURE 138.



Loop of ligature retracted over pedicle and placed between the two free ends, preparatory to tying Staffordshire knot.



free ends cross the loop, and make firm counter-pressure against the pedicle until complete constriction is secured, Figure 139; then with the aid of the assistant the ligature is securely tied. It is then passed around the pedicle and tied again. The advantages of the knot are that, while it ties the pedicle in two halves, these halves are compressed into one mass. They are, moreover, uniformly compressed, and very great constricting force may be used.<sup>1</sup>

FIGURE 139.



Drawing Staffordshire knot tight and compressing pedicle, preparatory to tying.

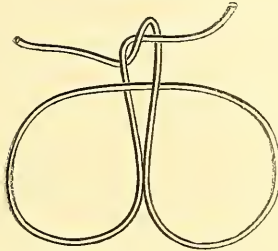
The author, after seeing Mr. Tait use the Staffordshire knot, undertook to use it himself. The result demonstrated the fact that a surgeon can sometimes get an immense amount of experience in a single case. The ligature was imperfectly applied, and death from hemorrhage resulted in a few hours. The essential precaution is to draw the ligatures very tight, and secure thereby the maximum constriction before the knot is tied. To guard against the loosening of the ligature between the time of tightening and the time of tying it, the thumb and finger should still retain their hold, as shown in Figure 139, until the knot is securely tied. This will necessitate, in making the knot, the help of the assistant's hand in addition to the free hand of the operator; or the ligature, while held securely by the operator, may be tied by the assistant. It is always important, as an extra precaution, to pass

<sup>1</sup> Adapted from Tait's Diseases of the Ovaries, 1883, p. 287.

the thread in the ligature groove all around the stump a second time and tie tightly *en masse*. If properly applied this knot is safe and practical. The figure-of-eight ligature, however, in the hand of an inexperienced operator, is safer.

No single mode of ligature should be used to the exclusion of others. Ofttimes the pedicle, too large to be secured by a single or double ligature, may be safely tied in several parts.

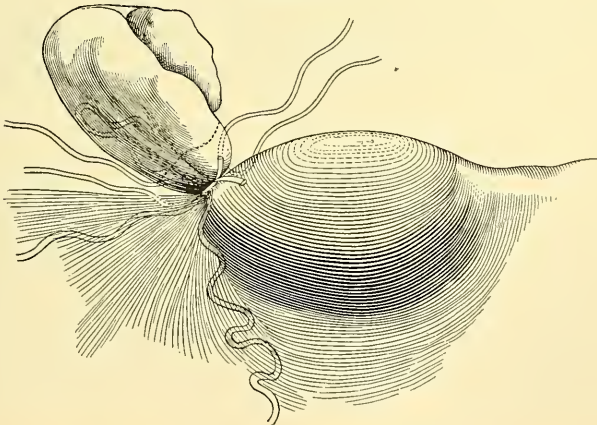
FIGURE 140.



Showing the form of the Staffordshire knot.

Most operators, for extra safety, apply an additional ligature to the ends of the ovarian artery on either side of the stump; one passes around and constricts the free margin of the broad ligament between the ovary and the lateral wall of the pelvis. This is the part of the broad ligament through which the ovarian vessels pass. It is called

FIGURE 141.



Showing the Staffordshire knot tied and anchorage ligatures passed but not tied.

the infundibulo-pelvic ligament. The other ligature surrounds the horn of the uterus and includes much of the broad ligament at the point where the Fallopian tubes join the uterus. These two ligatures, one on either side of the stump, are also passed through the pedicle on the distal side of the ligature, so that when tied they not only secure the ovarian artery on both sides of the stump, but also serve

as sutures to unite that portion of the pedicle on the distal to that portion on the proximal side of the ligature. The ligature is thereby covered by the union of the surfaces on either side of it. One or two other similar sutures may be so placed as to cover the ligature all around the stump. This device is a safeguard against cutting the pedicle too short and against the slipping off of the ligature. They should be passed and tied before the mass is removed. Figure 141 shows them passed but not tied.

During an operation the surrounding peritoneum should be protected against possible rupture of tubal or ovarian abscesses by the free use of sponges so placed as to absorb any escaping fluid. These sponges, if contaminated, should not be introduced into the cavity a second time, but should be removed, laid aside, and clean sponges used in their place.

The operation just described leaves the cut surfaces raw, and therefore more liable to become adherent to adjacent peritoneum. Such adhesion has produced kinking of the bowel and consequent fatal intestinal obstruction. Symptoms of intestinal obstruction from this cause if observed early may be successfully relieved by reopening the wound and breaking up the fresh adhesions. See page 132. In order to prevent such adhesion the omentum may be stitched over the stump with fine silk or catgut sutures, or the raw surfaces may be seared with the actual cautery.

**Operation Without a Pedicle.**<sup>1</sup> The decided advantages of this method will be at once apparent. The technique is as follows:

Place a ligature on the infundibulo-pelvic ligament—*i. e.*, on that portion of the broad ligament between the ovary and the wall of the pelvis. Place another ligature on the other end of the broad ligament where it joins the uterus. This ligature should not include the Fallopian tube. These two ligatures largely shut off the ovarian vessels from the parts to be removed. Grasp the tube, ovary, and adjacent portion of the broad ligament in the left hand, and with the scissors remove them. As these parts are severed, any bleeding-points may be secured by temporary forcipressure. If any of the tube is left the result may be impaired by the continuance of physiological and pathological processes after the operation; hence the necessity of carefully dissecting out even the cornual portion of the tube. Fine catgut ligatures are now placed upon the bleeding-points, and the margins of the broad ligament wound are whipped over and together by a fine, running catgut suture. The uterine wound made by dissecting out the uterine end of the tube is closed by interrupted sutures or by a continuation of the running suture just described.

Among the great advantages of this method are :

1. The omission of the tubal ligature and stump, which are apt to set up and perpetuate local irritation.
2. The entire removal of the tubes, which generally insures physiological and pathological rest for the remaining uterus.

<sup>1</sup> This has been proposed by Polk, *Clinical Gynecology*; Keating and Coe, p. 379; by Penrose, *American Journal of Obstetrics*, August, 1895, and by Watkins, *Transactions American Gynecological Society*, 1896. The peculiar glove-stitch shown in Figure 142 was suggested by Watkins.



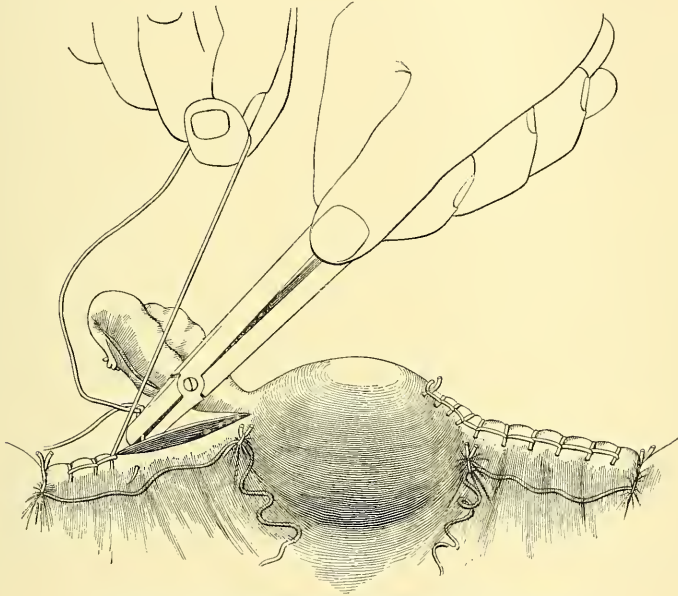
3. The normal relations of the round and broad ligaments to the uterus and their functions as uterine supports are maintained.

4. There is no stump which may possibly slough and produce sepsis.

5. The chance of post-operative adhesions is lessened by the covering of all exposed surfaces with peritoneum.

6. The tube being entirely removed and the tubo-uterine wound united by suture, there is no danger of infection from the uterine cornua. Ries has lately given timely warning of this danger, especially when the quickly absorbable catgut ligatures are used.

FIGURE 142.



Showing the glover's stitch and the method of introduction.

On account of these advantages, unless the patient's condition demands the more rapid application of the ligature *en masse*, to save time, the operation without a pedicle or stump is preferred.

In many cases the adhesions are so extensive and firm that the removal of the appendages requires great traumatism and the uncovering of broad surfaces—too broad to cover by any plastic work on the peritoneum. The rule, therefore, to cover all exposed surfaces, although sound, is often impracticable.

#### Complications.

The difficulties and dangers of the operation may be so great as to make it one of the most formidable in surgery. The special technique to meet the varied conditions of grave pelvic inflammation will turn first upon the presence or absence of pus or other infectious fluid, and, second, upon the question of adhesions.

**Technique in Pus Cases.** Although the pus in chronic pyosalpinx is usually sterile, it is not always so; hence it is safer to proceed, except in matters of drainage, on the supposition that all pus or other fluid is infectious, and, if possible, therefore, to enucleate the sac without breaking it. Aspiration of a part of the fluid from a very tense tube may decrease the risk of rupture. Contact of the pus of a ruptured tube with the peritoneum may have no serious results, for:

1. The fluid may be sterile, and therefore innocent.

2. Even though infectious, if thoroughly washed or sponged out, the residue of septic matter may be taken up by the peritoneum and thrown off by the organs of elimination. The capacity of the peritoneum to take care of such fluids is very great. The conditions, however, under which it does or does not do so are not fully known. See Chapter VII., on Drainage.

The coexistence of pyosalpinx and a communicating parametric abscess clearly renders the clean enucleation of the pus sac impossible. After the removal of such a tube the parametric abscess cavity must in every case be in direct communication with the pelvic cavity. A free opening from the cul-de-sac of Douglas into the vagina and effective gauze drainage by that route are now desirable. If possible, the general abdominal cavity should be shut off by stitching the omentum or peritoneum over the abscess wall. If there be a parametric abscess pure and simple, without tubal or other connections, the pus is much better evacuated and drained through the vagina. This would involve the abandonment of the abdominal route and the substitution of the vaginal. In some cases, even with tubal connections the vaginal route is preferable.

When the pelvic viscera are matted together with strong and extensive adhesions, including a great quantity of inflammatory exudate and pus, the operation may become long, extensive, and very dangerous. Such conditions usually require a relatively long incision. In addition to the removal of the appendages, vaginal drainage and hysterectomy may be necessary. These cases frequently offer most favorable indications for the vaginal route.

The class of cases described in the foregoing paragraph furnish most of the mortality in oöphoro-salpingectomy. Such formidable conditions may even prohibit the radical operation and require, instead, simple incision and drainage of the pus cavity. Ofttimes the adhesions between the visceral peritoneum covering the diseased organs and the parietal peritoneum through which the incision is made are so extensive that the operator may find his way directly into the pus cavity without exposure of the general peritoneum. In such cases it may be wise not to attempt the removal of the appendages, nor even to make a complete diagnosis, but rather to locate, incise, and drain the pus cavity. A more radical operation may be made later, if necessary.

When the adhesions above described do not permit the direct opening of the pus cavity without exposure of the general peritoneum, the surgeon may, after making the exploratory incision, locate the pus sac, and without immediately opening it stitch it to the parietal peritoneum. A few days later, when adhesions have formed, the abscess may be

opened without involvement of the general peritoneum. Many surgeons perform both operations at one time, as follows:

1. Open the abdomen and locate the pus-sac.
2. Pack sponges all around to protect the peritoneum.
3. Remove the fluid by the aspirator.
4. Wash out the sac by reversing the action of the aspirator, care being taken not to contaminate the surrounding peritoneum.
5. Enlarge the aspirator opening by incision, and unite with interrupted catgut sutures the visceral peritoneum around this incision to the parietal peritoneum around the abdominal incision—*i. e.*, join the two incisions into one.
6. Curette the sac for the removal of granulations, blood-clots, and other undrainable material.
7. Drain with rubber tube or glass tube or gauze. Constant drainage may be required for months before permanent closure of the wound. So long as the patient's health improves or continues good it is better to wait for the sinus to close. If at any time there be evidences of new pus formations a radical operation for the removal of the tube should be considered.

Upon opening the abdomen one may locate a pus sac adherent to some other part of the abdominal wall. It would then be good surgery to close the first incision and make another directly into the sac. The abscess could then be evacuated without contamination of the peritoneum.

The cases above described are often more efficiently treated by vaginal section and drainage, or by the removal of such organs through the vagina, as the case may require.

The indications and technique of working and sponging out the peritoneal cavity, and the indications and modes of abdominal drainage and the toilet of the peritoneum are discussed under the General Principles of Peritoneal Surgery, in Chapters VI. and VII.

**Technique in Adhesions.** Conservative surgery specially reserves for enucleation only hopelessly diseased organs. Strong and extensive adhesions are among the most common difficulties in their removal. The first objective point, as in the simple cases, is the fundus and posterior wall of the uterus. From this point the finger searches out the diseased organs on either side and recognizes their relations to adjacent structures. An ovary or tube, even though imbedded in apparently inseparable adhesions, may often be shelled out with relative ease if the weaker lines of cleavage can be found and made the starting-points of the enucleation. Let the tip of the index-finger and middle finger of the left hand search for sulci between the diseased appendages and the adherent surfaces. Look for points of least resistance, and follow their lead so long as the separation does not require undue force; then look for other such points; the finger advances with gentle firmness, using the side-to-side and to-and-fro motion until by pressing here and there, and by pinching the adherent structures apart, the outlines of the offending organs are made clearer and clearer. By this means they are finally isolated and brought up into the wound. The technique of their removal is then the same as for non-adherent appendages.



**Technique in Hemorrhage.** During the enucleation it is not well to stop for minor bleeding-points. Let the organs be isolated from the bed of adhesions as rapidly as safety will permit. Always keep sponges packed around to control hemorrhage by pressure and absorb blood, pus, or serum. When the appendages are cut off and the ordinary ligatures applied the bleeding will usually have ceased. If not, pack hot sponges firmly against the bleeding surfaces, frequently changing them to prolong the heat. Double ligature of the ovarian vessels on either side of the stump, as already described, is always a good safeguard and often necessary. A sterilized saturated solution of antipyrine, as recommended by Roswell Park, is a valuable hæmostatic. If bleeding is not controlled by prolonged hot-sponge pressure, antipyrine, and ligature of the ovarian vessels, and the bleeding-points cannot be secured by isolated ligatures, it is better not to prolong the operation by temporizing, but to insure hæmostasis by immediate ligature of the uterine arteries. The ligature is applied in the same manner as for abdominal hysterectomy.

**Technique in Abdominal Hysterectomy.** If in the course of the operation the indication arises for the removal of the uterus, the operator must proceed to it at once. See later paragraphs on the indications for hysterectomy. The danger will now multiply rapidly with delay. The broad ligaments, including the ovarian vessels, are ligatured and cut away. The uterus meanwhile should be drawn strongly up into the wound. This serves the double purpose of checking the hemorrhage from the cut ends of the uterine vessels and bringing the lower uterine attachments within the operator's easier reach. A circular incision around the uterus is made just above the utero-vesical fold, and the adjacent circumuterine structures are stripped away from the uterus, the separation being close to the uterus. This is done with the handle of a scalpel or the finger, or both. Bleeding-points from the vaginal or rectal anastomoses are secured by catgut ligatures. In the course of this enucleation the uterine arteries are isolated and ligatured separately, or located by the sense of touch, and tied *en masse*. To avoid the ureters the arteries must be tied close to the uterus. The uterus is now cut away and the peritoneal margins of the wound are inverted toward the vagina. If drainage is not required the vaginal opening is closed on the peritoneal side by fine, continuous or interrupted catgut sutures. See technique of hysterectomy for cancer.

It is sometimes difficult to work one's way from above into the vagina. After stripping off the bladder, this may be much facilitated by a longitudinal incision through the anterior wall of the cervix and the os externum into the vagina. The incision is described with an illustration in the chapter relating to hysterectomy for myoma. The removal of the uterus is sometimes made easier by introducing a Simon speculum into the vagina and dividing the peri-cervical structures as in the beginning of vaginal hysterectomy.

Drainage, if used, should be into the vagina. The gauze is best introduced through the abdominal wound and carried thence into the vagina. See page 124, on Vaginal Gauze Drainage.

**Technique in Intestinal Opening.** Mention has been made of the

breaking through and discharge of the contents of a pus tube into an adherent intestine. The enucleation of such a tube would necessarily leave an opening in the intestine. Some provision must then be made to keep the contents of the bowel from escaping through this opening into the free abdominal cavity. There are several possible plans of procedure.

1. If the opening is small and accessible it should be closed with sutures and treated according to the requirements, with or without abdominal drainage.

2. If the opening is accessible and the loss of bowel wall so great that its repair with sutures would destroy the permeability of the bowel, the indication is for resection or for stitching the opening into the abdominal wound, and making thereby an artificial anus. Unless contraindicated by the exhausted condition of the patient, resection might be preferable, for if the artificial anus did not close spontaneously resection would subsequently have to be made.

3. If the opening is so deep in the pelvis as to be inaccessible, or the patient is too exhausted to permit suture, the territory around the fistula may be quarantined from the general peritoneum by means of gauze packing. Adhesions will form in a few hours around the packing, and thereby shut off the leaking bowel from the general peritoneum. The writer has successfully treated two cases by this method. The gauze may be brought out through the abdominal wound, or if the fistula is deep in the pelvis it is better to pass the gauze drain into the vagina through an opening made for the purpose and close the abdominal wound.

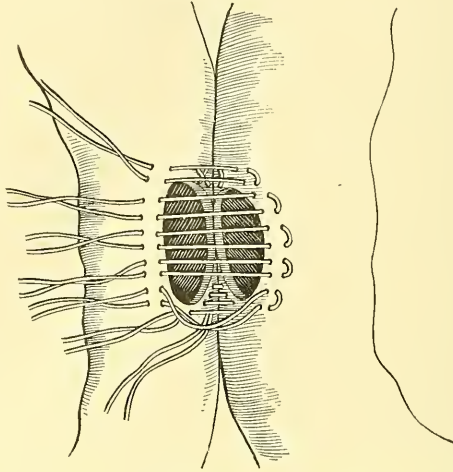
4. If the fistula is too large for suture, the parietal peritoneum may be made to take the place of the lost intestinal wall. This will require the edges of the fistula to be united to the abdominal wall by means of a plate of decalcified bone or other material. The plate should have small perforations one-sixth of an inch apart all around near its outer edge; it is placed inside the intestinal opening, and through this perforation the margin of the bowel may be stitched to the parietal peritoneum. The sutures should transfix the bowel wall and the abdominal wall and be tied on the skin. This would approximate serosa to serosa.<sup>1</sup>

The following case is illustrative and instructive. In a recent operation at St. Luke's Hospital, Chicago, a large friable pus tube was in communication with the bowel at two points. After enucleation there was a fistula too large to be closed at each of these points. The bowel wall surrounding the fistula was, moreover, extremely thickened and friable. The first impulse was to resect the bowel at each point of injury. Instead of this most formidable operation, however, the following plan was successfully adopted: The two openings were brought together and united by three rows of fine continuous sutures. The fistulae were thereby utilized as openings for an intestinal anastomosis. The abdominal wound was closed without drainage save a slight gauze drain extending from its upper angle to the neighborhood of the intestinal sutures. This drain was removed on the fourth day. Both

<sup>1</sup> So far as the writer is informed this method has never before been suggested.

intestinal and abdominal wounds have permanently closed, the latter with slight suppuration. This principle has been employed in the repair of gunshot wounds; but, so far as the writer is informed, it has never been used in a case like this.

FIGURE 143.



Anastomosis of the intestine at the two points where it had communicated with the sactosalpinx. One row of sutures introduced. Author's case.

#### VAGINAL SECTION.

The maxim that every peritoneal section should begin as an exploration holds true as well for vaginal as for abdominal section. Thorough sharp curettage and cleansing of the endometrium are essential preliminaries. The object is, first, to remove the original source of infection, so that in case the uterus and its appendages on one or both sides are not removed the danger of further infection from the endometrium will be reduced to the minimum; second, to prevent infection of the peritoneum from the uterus during the operation. Vaginal section according to the indication is made either anterior or posterior to the uterus, or both anterior and posterior.

#### *Posterior Vaginal Section.*

The posterior incision is made close to the uterus, between the cervix uteri and the rectum, from the post-vaginal fornix into the pouch of Douglas. The steps of the operation are as follows:

1. The patient to be in the dorsal position and the vaginal portion of the cervix exposed by Simon's retractors.
2. A semicircular incision, large enough to admit two fingers, to be made directly behind the uterus in the line of the utero-vaginal attachment; the incision to be made with blunt-pointed scissors curved on the flat, the point being directed toward the uterus, and the cervix being drawn down by the vulsellum forceps.



3. The loose cellular tissue back of the cervix between the vagina and the pouch of Douglas to be stripped back off from the cervix by the blunt point of the scissors, by the handle of a scalpel, or by the finger until the peritoneum is reached.

4. The peritoneum to be divided close to the uterus by a snip of the scissors. The closed scissors points to be now passed through into the pouch of Douglas and the opening dilated by spreading the blades. The opening to be still further enlarged if necessary by careful cutting with the scissors or by tearing with the fingers.

5. The index and middle fingers of the left hand are now introduced into the pouch of Douglas, and a digital exploration of the pelvic cavity is made. If sufficient room has not been gained a perpendicular incision, beginning in the middle of the posterior border of the one already described and running toward the rectum, may be made. In cutting down toward the bowel the left index-finger in the rectum should be used as a guide. This finger is now withdrawn, thoroughly cleaned, and reintroduced into the pouch of Douglas; the right hand is placed over the hypogastrium behind the pubes, and the examination is made precisely as in ordinary bimanual palpation, but with a distinct advantage—*i. e.*, the palpating finger is in direct contact with the uterus and its appendages.

Through this incision the various operations upon the appendages may be performed. The tubes, ovaries, and corpus uteri—the adhesions, if present, having been broken up—may be drawn through the wound into the vagina and examined. One or both of the appendages may be removed. The incision may be extended, if necessary, to a vaginal hysterectomy, which usually involves also the removal of the appendages.

Posterior vaginal section is not well adapted to the removal of the appendages; it is, however, specially applicable to the incision and drainage of pelvic pus-cavities. These cavities may be in the tubes, ovaries, or pelvic connective tissue. The operation for their incision and drainage will be described on page 268.

#### *Anterior Vaginal Section.*

Peritoneal section anterior to the uterus—*i. e.*, between the uterus and bladder, renders the uterus and its appendages more accessible to conservative or radical operation than posterior section, but less accessible than abdominal section. The technique is similar to that of posterior section, and is as follows:

The patient is in the dorsal position and the cervix exposed by Simon's retractors. The cervix is seized with vulsellum or bullet forceps and drawn toward the vulva. A transverse semicircular incision close to the uterus, in a line with the utero-vaginal attachment, is made with scissors through the anterior vaginal fornix, or, instead of this, the incision is made in the longitudinal direction in the median line through the anterior vaginal wall from the anterior wall of the cervix toward the bladder. The latter incision is preferable, because, without great care, especially if the cervix is small, the transverse

incision is liable to injure the ureters. In making the transverse incision, the operator should not only draw the cervix uteri well down, but also make strong downward traction on the anterior vaginal wall. This is done with a tooth- or bullet-forceps attached to the wall between the cervix uteri and the urethra. If the longitudinal incision give insufficient room it may be supplemented by the transverse. The combined longitudinal and transverse cuts have the shape of the letter T. They are shown in Chapter XXVII., Figures 169 and 170, also in Figure 144.

The uterus is now drawn strongly forward, and the structures adjacent to its anterior wall are stripped off, keeping close to the uterus, as described above for posterior section. As the bladder is being separated from the uterus it is held up out of the way by an anterior retractor or the finger. When the peritoneum comes into view it will be recognized as a thin, translucent membrane reflected from the uterus. A sound in the bladder will prevent mistaking that organ for the peritoneum. The peritoneum being exposed, it is snipped with blunt-pointed scissors. The opening thus made into the pelvic cavity is enlarged by introducing the two index-fingers and tearing laterally, and, if necessary, by careful cutting with the scissors. During the separation of the bladder from the uterus a sound in the uterine canal may be useful as a guide.

The corpus uteri may now, if adhesions do not prevent, be seized with vulsellum- or bullet-forceps and drawn forward into extreme anteversion. The fundus may even be drawn into the vagina. If there be adhesions they may be loosened with the left index-finger introduced over the fundus uteri, the corpus being at the same time drawn more and more into the vaginal opening. The Fallopian tubes and ovaries follow the corpus, and may thus be subjected to examination and any necessary operation. They may be wholly or partially removed as in abdominal section. The closed fimbriated extremity of a tube may be opened or the ovary may be resected. See *Conservative Operative Treatment of Adnexal Inflammation* in the following paragraphs, pages 266-270.

The Removal of the Appendages by anterior vaginal section does not materially differ in technique from their removal by abdominal section. Hæmostasis may be secured by the usual ligature of the stump close to the uterus or by running sutures in the broad ligament. See pages 247-253. The appendages should be brought into full view; this may require very firm traction, and the uterus may have to be drawn from side to side. Ligature of the infundibulo-pelvic ligament, which controls the ovarian vessels, is often difficult, sometimes impossible. This most important part of the operation should be under control of the eye. Sometimes the ligament, if very short, tense, and adherent, cannot be reached through the vagina. It might then be safer to abandon the vaginal and resort to the abdominal route. If there is difficulty in restoring the uterus, enlarged by congestion, from torsion of the ligaments, the Simon retractor may be used in the manner of a shoe-horn, and the uterus slid in on the smooth blade.

The blood-clots having been sponged out and all bleeding-points secured, the wound is closed as follows: The peritoneal margins are drawn down and approximated by means of pressure forceps. They are then whipped together with a running, fine, catgut suture. The suture is continued as a buried suture to unite the vesical to the uterine surfaces of the wound and, finally, as a running suture to close the vaginal margins. The vagina is lightly packed with aseptic gauze. The anterior incision, except for drainage of pus-cavities, is preferable to the posterior. It involves less danger of post-uterine adhesions, which may result in fixation of the retroverted or retroflexed uterus. Moreover, it offers by anterior vaginal fixation a cure for the retro-malpositions. See Treatment of Retroversion and Retroflexion by Vaginal Fixation, Chapter XLVII. In some cases intrapelvic disease is rendered more accessible by the combined anterior and posterior incisions.

#### Effects of the Removal of the Uterine Appendages.

The removal of the diseased appendages has been usual in hydrosalpinx and is the rule in pyosalpinx. The operation, if thoroughly performed, is generally followed by atrophy and consequent arrest of function in the uterus. Its result should be to precipitate the menopause. The artificial production of this critical period gives rise to phenomena quite similar to those which characterize its natural course, except that in most cases menstruation is at once permanently arrested. The popular impression that the operation unsexes the woman in a mental sense or renders her masculine is a mistake. Patients frequently ask whether it will result in the growing of a beard or the development of a bass voice, but no such result has ever been observed. The operation performed on a young girl would doubtless arrest the intrapelvic and some of the extrapelvic developmental processes of puberty, but the development once made is permanent.

The effect of the operation upon the sexual desire is variable, but probably no more so than that of the natural menopause.

The question of insanity as a result of the operation has been raised; it probably occurs no more frequently than after other operations of equal gravity, positively not oftener than with the natural menopause.

The primary object of the operation is the removal of certain organs which would otherwise be dangerous to life or destructive to health. A most important secondary result is the arrest of physiological function in the remaining uterus. In this connection it is clear that, since pathology is physiology modified by disease, the atrophic changes in the uterus consequent upon the operation may, at the same time that they arrest physiological processes, also put an end to the pathological processes. Especially is this true in the inflamed uterus, the disease of which is often perpetuated by the constantly recurring menstruation. The frequent disappearance of metritis from the atrophic uterus verifies a recognized principle, that physiological rest may favor the cure of disease. If the uterus is healthy or only the seat of mild catarrhal inflammation, it will usually, upon the removal of the appendages, go rapidly into the atrophic state, and will give no more



trouble than would a uterus after the usual menopause. Unfortunately, however, this very common sequence of the removal of the appendages is not constant. The atrophic process does not always follow, or, if present, may fail to remove the infection. The infected uterus may be the source of pernicious menstruation, amounting at times to menorrhagia. A surviving and intractable endometritis often gives rise to profuse uterine discharges. Exhaustive drains upon the patient's strength from such cause may destroy her resistance to disease, reinforce the uterine infection, and perpetuate a group of disabling nervous symptoms.

### Should the Uterus be Removed with the Appendages ?

This question has been forced upon the surgeon by the numerous immediate and remote failures which have followed the removal of the appendages alone. When the appendages on one side are healthy, or not diseased enough to necessitate their removal ; when on one or both sides enough can be left to give hope that the reproductive function may be preserved, the answer is clearly negative. The essential question is, What shall be done with the uterus when the appendages on both sides have to be removed ? It may be urged with considerable force that the failure to bring about atrophy of the uterus and arrest of function, and to secure consequent relief from the pernicious symptoms above mentioned, comes, in many cases, of faulty technique in the operation. Arthur W. Johnstone and Lawson Tait have shown that when the tubes are taken off close to the uterus and every particle of the appendages removed, arrest of menstruation, atrophy of the uterus, and the satisfactory menopause, even in the cases of infectious uteri, are apt to follow. The explanation is simple. The thorough removal of the tubes at the same time cuts off the ovarian artery and the supply from the uterine artery at its point of anastomosis with the ovarian ; also, as pointed out by Johnstone, it cuts in a similar way the nerve connections of the uterus ; hence the observed atrophy and arrest of function. It follows from the above that if the appendages are properly removed hysterectomy is not necessarily indicated. The claim of the enthusiastic hysterectomist, therefore, that when the appendages have been sacrificed the uterus necessarily becomes a pernicious, continuous, disabling and dangerous source of infection may, as a universal proposition, be disregarded. In order to bring about the most satisfactory results the tubes should be removed not merely close to the uterus, but the entire tubes, even as they penetrate the cornua, should be removed to the uterine mucosa, and the cornual wounds should be closed by catgut sutures. Ries has called attention to the fact that the removal of the tube by the ordinary stump and ligature method often results in leakage of uterine secretions.

When the infection is *acute* the prompt removal of the appendages upon extension of the infection to those organs and to the peritoneum has been generally approved, and is common practice. The propriety of leaving the infected uterus while the causative infection in the endometrium is still overwhelming the pelvic lymphatics with its

septic supply is questionable; for the uterine infection may continue to spread to the peritoneum even after the removal of the appendages. The removal of the uterus, together with the appendages, may be necessary for two reasons: first, to cut off the septic supply; second, to facilitate drainage. When this is done convalescence is more rapid and less complicated. A supply of infection constantly poured through the lymph channels from the uterus to the peritoneum might be a greater indication for hysterectomy with drainage of the pelvic cavity than for the removal of the appendages; this would be especially true in very virulent puerperal cases.

#### Objections to Hysterectomy.

1. The fact that the uterus serves as a sort of support for the vaginal vault and is necessary, therefore, to the integrity of the pelvic floor and vagina.

2. The possibility that the removal of the uterus, in addition to the removal of the appendages, disturbs the moral and physical well-being of the woman to a greater extent than the removal of the appendages alone. However this may be, many women have the strongest aversion to its removal. So far as may be, without harm, their wishes should be respected.

3. The fact that the removal of the uterus, especially by the hand of a slow or inexpert operator, involves additional shock and danger.

4. The possibility that hysterectomy may cause secondary degenerative changes in the spinal cord or brain. This apparent result has been observed as a sequel of major operations in other parts, especially those involving extensive injury to nerve structures.

5. The absence of a clear indication.

#### Indications for Hysterectomy.

1. The matting together of the reproductive organs in one infected mass, with pockets of pus. The difficulty of operation does not, necessarily, neutralize this indication.

2. Tuberculosis of the reproductive organs.

3. Complicating malignant disease.

4. Complicating uterine myoma which cannot be removed without sacrificing the uterus.

5. The involvement of the endometrium in destructive inflammation so that the uterine wall, itself strongly infected, becomes virtually the wall of a pus-cavity; under these conditions the uterus is at once a pernicious source of danger to health and life, and, if removable, should under no circumstances be left.

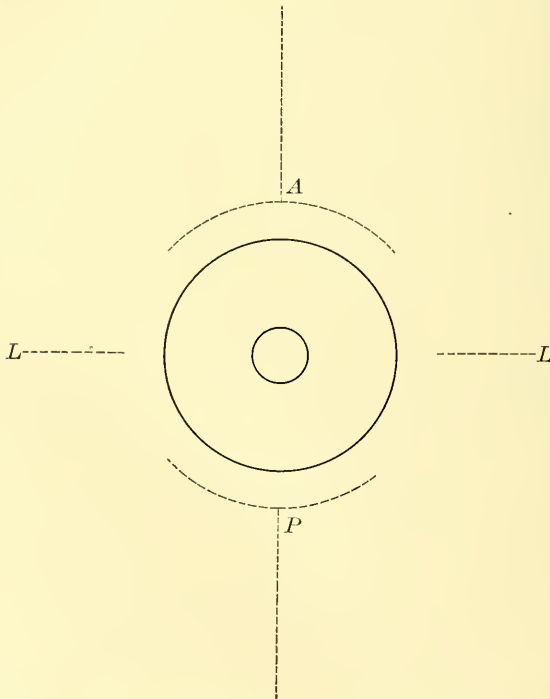
The value of the uterus as a support and a completion for the vaginal vault has led some operators to remove the corpus and leave the cervix, or at least the vaginal portion of it. This occurs only when the operation is done by the abdominal route, a route which contemplated originally but one wound, and that through the abdomen. To leave the cervix, therefore, after the removal of the corpus, is a natural

corollary of the abdominal operation. If hysterectomy, on account of the infectious character of the uterus, is to be done at all, the operation should at least include that part which is usually most infected and therefore most pernicious—the cervix. The idea of leaving it would never occur in connection with the vaginal operation.

#### Technique of Vaginal Hysterectomy.

All preparations are made as for vaginal section, including curettage of the endometrium. The patient is placed in the dorso-sacral position, the legs protected with long, sterilized woollen stockings. The vagina, having been thoroughly disinfected, is held open by Simon's retractors, and the uterus seized and drawn down as in ordinary vaginal section. The cervix is then incised all around by a circular cut in a line with the utero-vaginal attachment. The uterus is then detached from the bladder anteriorly and the rectum posteriorly, precisely as in anterior and posterior vaginal section.

FIGURE 144.



Lines of anterior, posterior, and lateral incisions in vaginal section. A. Anterior incision. P. Posterior incision. L, L. Lateral incisions.

In order to gain greater space for operating two lateral incisions, each about one-half inch long, may be made in the vaginal wall. These incisions extend from the lateral margins of the vaginal wound and resemble similar incisions already described in anterior and poste-



rior sections. If still greater space is needed the perineum may be divided longitudinally, but should be reunited at the close of the operation.

If the uterus is in its normal position the corpus may be drawn through the anterior opening; if retroverted or retroflexed, it may be everted through posterior opening. This is accomplished by tenacula or vulsellum-forceps. Seize the corpus as high as possible, draw it down as far as it will come, then grasp it higher up and make more traction, and so on until the eversion is complete. The broad ligaments are then clamped by strong pressure-forceps or tied off by ligatures, as described in the operation of hysterectomy for cancer. During the operation lateral, posterior, and anterior retractors are frequently required.

If the uterus is large it may be removed in parts. The operator cuts off piece after piece with the scissors. This gives more working room. The method is known as morcellation. The anterior or posterior lip of the entire cervix may be first removed. Then the corpus may be split in the median line and each half separately removed, or the entire uterus may be divided in the longitudinal axis and each half removed by itself. Before cutting the uterus away from the broad ligaments they should be previously clamped or ligatured. If the broad ligament is very large and short, it may be necessary to tie it in parts. If the corpus cannot be drawn into the vagina, the ligaments and their vessels may be clamped or ligatured and cut progressively until they have been entirely severed and the uterus removed without eversion. In some cases a single clamp guided by the finger may be made to compress an entire broad ligament. Eversion of the uterus and consequent torsion of the broad ligament may tend to slipping off of the clamps or ligatures. Fatal hemorrhage has been attributed to this cause.<sup>1</sup>

The difficulties are much increased when the uterus and its appendages are fixed by adhesions. The uterus being drawn down and steadied by the vulsellum-forceps in the right hand, the adhesions are broken up by the finger precisely as in the operation already described for the removal of the appendages. The adherent appendages having been freed, the operation proceeds as if there had been no adhesions. The further technique of closure of the wound is laid down in the description of hysterectomy for cancer.

*Drainage.* This class of cases offers a large field for drainage. Gauze is preferable to tubular drainage. The technique of its application and removal is described in Chapter VII. The clamps, if left, also in a measure serve the purpose of drainage. They should, however, be removed at the end of forty-eight or seventy-two hours.

#### Hysterectomy without Removal of the Appendages.

When the appendages are firmly matted and bound together, and are almost inseparable from the surrounding structures, and their removal practically forbidden by the desperate risk of the operation, the uterus

<sup>1</sup> Cushing. *Annals of Gynecology*, January, 1896.

may be removed and the pus-sacs freely opened and left to drain into the vagina. Even if some pus-pockets are overlooked, they will probably break sooner or later into the wound. Such pus sacs, whether tubal, ovarian, or parametric, when drained in this way, as a rule, become obliterated; if tubal or ovarian they generally undergo atrophy. Although this partial operation is only permissible for the reasons above given, yet it has been followed by entirely satisfactory results. The explanation in the following paragraph is submitted.

The removal of the appendages and consequent cutting off of the vascular and nervous connection of the uterus is usually followed by atrophy, cessation of function, and subsidence of disease in that organ; conversely, similar results in the Fallopian tubes and ovaries should naturally follow the cutting off of their vascular and nerve connections by the removal of the uterus. In one case of hysterectomy the remaining tubes, however, became healthy, but did not atrophy. On the contrary they were, during several years after the operation, the medium of menstruation. The menstrual fluid passed from them into the vagina.<sup>1</sup> This case speaks against the idea that the tubes do not participate in menstruation. In another case<sup>2</sup> pregnancy occurred in the isthmic portion of the tube; there was consequent hemorrhage into the vagina; the tubal opening was dilated and the product of conception curetted away.

#### Aspiration of Hydrosalpinx through the Vagina.

The contents of sactosalpinx serosa—hydrosalpinx—may be removed in this way, and if the aspiration be followed up by efficient local massage of the tube the cure may be permanent. As explained on page 232, the occluded ends of the distended tube may have closed mechanically from swelling of the mucosa or organically from adhesive inflammation. Spontaneous reopening of the tube and restoration of its functions are probable under the former, improbable under the latter conditions.

#### Vaginal Incision and Drainage of Sactosalpinx.

Incision and drainage of sactosalpinx is a recognized procedure.<sup>3</sup> Landau rather warmly recommends it even in pyosalpinx. Its value, however, is more positive in hydrosalpinx. The procedure, even when successful, seldom restores the function of the tube, but produces rather complete obliteration of the lumen, thereby converting it into a cord. The same process sometimes occurs spontaneously as a result of recurring appendicitis or recurring salpingitis. The disease is then known as appendicitis obliterans or salpingitis obliterans. Incision and drainage may bring about or hasten this result. The indication for incision and drainage for parametric abscess is much clearer than for sactosalpinx. See page 225.

<sup>1</sup> Weller Van Hook. Unpublished case.

<sup>2</sup> Wendener. *Centralblatt für Gynäkologie*, 1896, No. 4, p. 111.

<sup>3</sup> Landau. *Archiv für Gynäkologie*, No. 40, p. 85. August Martin. *Die Krankheiten der Eileiter*, p. 208.

Incision and Drainage for Chronic Sactosalpinx when the distended tube can be isolated by palpation is performed as follows : First the vagina and vulva are to be thoroughly disinfected, the patient being in the lithotomy position ; the sactosalpinx, by steady pressure of the assistant's hand, is now fixed downward toward the vagina, and a trocar properly curved or straight, guided by the left index-finger, is introduced into the sac. On this trocar as a guide, with sharp-pointed scissors enlarge the opening so as to admit the finger. The scissors are made to enlarge the opening by working their point through the wall with alternate spreading and closing of the blades. The sac is washed out with a hot 1 to 3000 bichloride of mercury solution and drained with gauze saturated with a 1 per cent. solution of formalin. This gauze is removed and replaced in forty-eight hours by ordinary antiseptic gauze. The formalin is not repeated except at rather long intervals, and, if healing progresses rapidly, not at all. The sac, if it does not contract promptly, may be cauterized with a saturated solution of iodine in carbolic acid.

The operation should always and imperatively include the thorough removal of the causal infection in the uterus by aseptic sharp curettage. Failure to do this will often lead to disastrous results. In hydrosalpinx aspiration and massage, as outlined above, may bring about restoration of the tubal function, and should therefore be tried before incision and drainage. The method has been nearly obsolete for twenty years. Its results before the days of Battey, Tait, and Hegar would show relatively few immediate cures and a discouraging number of failures to arrest the pernicious or fatal march of tubal and ovarian suppuration. On the other hand, the more radical extirpation of the diseased organs has saved innumerable women from lifelong invalidism or death. The re-establishment of incision and drainage as a recognized and useful procedure has, however, been made possible by the addition of sharp uterine curettage and aseptis.

There will always be great difficulty in drawing the line between those cases which may be relieved by incision and drainage and those which demand extirpation. The former treatment will be applicable to the more recent and acute cases. The older chronic suppurative cases in which permanent changes have taken place will often require extirpation of the diseased organs. In spite of the recommendation of Landau and numerous successful cases reported by Vulliet, Goulliad, Abbott, and others, it is not strongly indicated in chronic pyosalpinx. The success of the operation requires the removal of the old and prevention of new infection ; and the fulfilment of these indications in the many possible cavities and recesses of a pus tube, and in the neighboring pus-pockets whose walls are deeply infected, is often beyond the power of simple drainage and disinfection.

*Tubercular Suppuration* in the uterine appendages offers the greatest resistance to all conservative measures, and is therefore generally admitted to contraindicate incision and drainage. The great frequency of chronic tubercular infection materially cuts down the number of cases suitable for drainage. It is, moreover, usually difficult to recognize and exclude the tubercular cases until the pus has



been removed and examined. The suggestion to defer the radical operation until conservative measures have been tried and failed is weakened by the fact that after incision and drainage the removal of the diseased organs is always more difficult, tedious, and dangerous.

The foregoing paragraphs relate more especially to incision and drainage for chronic sactosalpinx.

**Incision and Drainage for Acute Pelvic Suppuration.** The pelvic organs and products of inflammation may be matted and fused together in a conglomerate mass. The individual organs may be wholly unrecognizable. The patient's general state from septic poisoning is often so grave as to render a more radical operation extra-hazardous. In these conditions, whether the suppuration be tubal, ovarian, or parametric, or all combined, vaginal incision and drainage offer strong and positive indications. The advantages are :

1. Relative safety.
2. Relative efficiency.
3. Probable preservation and possible restoration to function of the diseased organs.

*Operation.*<sup>1</sup> After preliminary sharp curettage, the incision is made behind the uterus precisely as described on page 158, for posterior vaginal section. If the post-uterine circular incision gives too little space for thorough intrapelvic exploration and manipulation, an additional perpendicular incision may be made from the centre of the posterior border of the first. This incision runs in the median line of the posterior vaginal wall from the cervix toward the rectum. During the making of this incision the index-finger of the left hand should be in the rectum as a guide to prevent wounding the bowel. The finger, after thorough cleansing, being now returned to the pouch of Douglas, and the right hand being over the abdomen, the examination proceeds as in ordinary bimanual palpation. The left index-finger penetrates backward and to either side until the bimanual sensation indicates that the free peritoneum posteriorly is almost reached. In shifting the finger to the right or left, and with it the superimposed hand, the septic mass will usually be found and penetrated without difficulty.

The exudative material will be evident to the touch of the examining finger. In acute cases an abscess-cavity will usually be found. During these manipulations the peritoneal cavity may be accidentally opened. This does not specially add to the danger. It is well, however, to retain the finger in the opening leading to the abscess until any escaping pus may be washed out of the vagina, and the peritoneal cavity can be protected by gauze packing against the inflowing of pus. The finger may then be withdrawn and the pus-cavity evacuated; slight pressing upon the abdominal wall will help to empty the cavity. The packing is now replaced by fresh gauze and the finger reintroduced into the pus-cavity. This is for the purpose of finding and in like manner emptying any neighboring abscess; failure to do this may be disastrous. The other side of the pelvis is now explored, and, if necessary, treated in the same way. All hard inflammatory masses,

<sup>1</sup> Fernand Henrotin. The Conservative Surgical Treatment of Para- and Peri-uterine Septic Disease. Transactions of the American Gynecological Society, 1885. Adaptation.

whether pus-containing or not, are to be penetrated by the finger. No instrument save the finger is to be used after the incision through the vaginal wall has been made. All inflammatory foci having been penetrated, their exposed cavities are now to be packed with a single strip of sterilized gauze, about three inches wide, and saturated with a solution of formalin 1 to 200. The outer end of the gauze strip should be carefully retained in the vagina to facilitate removal. Considerable gauze should be retained in the vaginal wound in order to keep it open and insure drainage. The operation is completed by the application of a vaginal gauze tampon.

The inflammatory deposit will be found in some cases in the median line just posterior to the uterus. Whether intra-peritoneal or extra-peritoneal, it must be thoroughly penetrated and drained until it is evident by bimanual touch that the finger has reached its outermost limits. The finger should be worked from side to side until the surgical sense indicates that the drainage will be sufficient. In some cases the finger cannot go far back in the median line without opening into the peritoneal cavity, but turning to one side or the other, the layers of the broad ligament may be separated, and, without invading the peritoneum at all, the finger may be pushed into large lateral masses.

As already stated, the pelvic organs and products of inflammation are often so matted and fused together in a conglomerate mass that the operator may be unable to recognize individual organs. He is only guided to septic inflammatory masses by the touch. Parametric abscess and circumscribed intra-peritoneal accumulation of pus offer better chances of permanent cure than pus tubes.

Vaginal incision and drainage are sometimes indicated as temporizing measures in extensive chronic pelvic suppuration, even though it be tuberculous, if the patient's strength is inadequate to the more radical operation. Even though radical cure does not follow, there is usually prompt and pronounced improvement, often sufficient to permit the subsequent removal of the uterus and diseased organs by vaginal section. This class of cases offers the strongest indication for vaginal as against abdominal section. They are often practically inoperable by the former, though with relative safety manageable by the latter.

If the abdomen has been opened and the case appears to be more suited for the vaginal route, one may introduce the sutures for closure of the abdominal wound, and before tying them proceed according to the indication to the vaginal operation. This gives the additional advantage of the abdominal opening for guidance in the vaginal work.

### Salpingo-Stomotomie.<sup>1</sup>

This operation in selected cases is designed to save and restore the appendages to their normal function instead of removing them. August Martin reports sixty-five cases with two deaths, neither of which was of itself attributable to the operation. In 1885 he began to open the closed abdominal ends of tubes to study microscopically their contents and the condition of their walls. His method is as follows:

<sup>1</sup> A. Martin. *Die Krankheiten der Eileiter*, p. 213.

1. Bring the tube as much as possible to the abdominal wound.
2. Protect the other pelvic organs by placing under the tube a flat sponge.
3. Open the end of the ampulla with scissors. The point of closure may be recognized by a scar in which the fimbriæ are still visible.
4. Strip the tube of fluid by pressure applied from the uterine toward the abdominal end.
5. If the contents be serous, odorless, and all fluid, and the mucosa shows only slight swelling and reddening, and the folds are only flattened by pressure, the tube is slit up for a distance of about one inch.
6. If the condition in the upper part of the tube still appears to be only catarrhal, the longitudinal wound is closed with three fine catgut sutures. Any large superfluous tags are cut off.
7. The borders of tubal mucosa at the end of the tube and the peritoneum are united by fine catgut sutures so that the opening shall gape and the mucosa shall stay everted.

Hemorrhage is slight and easily controlled by fine ligatures. The everting sutures at the end of the ampulla hold the new ostium close to the ovary. The now reopened tube, together with the ovary, is replaced in the abdomen. Any ovarian adhesions are to be broken up. According to Martin, this operation offers no greater dangers than any other cœliotomy complicated by peritonitis. Pregnancy followed in two cases in which this operation had been performed on one side and the appendages had been extirpated on the other.

The general conclusion is that extirpation for atresia of tubes whose contents are not infectious may be unjustifiable. The operation, however, can result in restoration of function only when the uterine end is open, or, if closed, the closure is due to swelling and not to inflammatory adhesion.

#### Resection of the Ovary.

The diseased portion of a partially diseased ovary may be removed by resection, and the remaining healthy part saved. The indications for resection are these :

1. Preservation of a portion of the ovary in order to preserve its reproductive functions.
2. Preservation of a portion of the ovary in order to preserve menstruation and other functions of probable importance not definitely known, among them possible elimination and secretion.

Reproduction has repeatedly followed the operation when the uterus, the tube, and only a very small fragment of the ovary were left. The duty of the surgeon to leave for this purpose, when practicable, any functioning part of an ovary is therefore clear.<sup>1</sup> The preservation of menstruation and other possible functions is urged by many competent observers. As a rule, women are better mentally and physically if menstruation and ovulation are maintained up to the period of nature's menopause. The possible secretory and eliminative functions of the

<sup>1</sup> Polk, Operations of the Uterine Appendages, with a View to Preserving the Functions of Ovulation and Menstruation. Transactions of the American Gynecological Society, 1893.



ovary justify the operator in leaving it or any healthy portion of it, even though the diseased tubes and uterus have to be removed.<sup>1</sup>

*The Operation of Resection* simply involves the excision by scalpel or scissors of the diseased portion and closure of the wound by means of fine interrupted or continuous catgut sutures.

All conservative operations for opening closed tubes and resection of ovaries should be supplemented by the release of the appendages from any adhesion which may be present.

#### Relative Advantages and Disadvantages of the Abdominal and Vaginal Routes in Pelvic Surgery.

*The controlling advantages of the abdominal route are these :*

1. A larger field for operation; more room for work.
2. The operator may see what he is doing instead of depending largely on touch.
3. Diagnosis of unsuspected conditions and complications is much easier.
4. The abdominal section is adapted to large tumors and pus-sacs, and to conditions high in the pelvis.

5. The appendages may be removed with better chance of avoiding rupture of a pus-sac.

6. Less danger of wounding intestines, bladder, or ureters and greater facility in the control of hemorrhage.

*The advantages of the vaginal route in suitable cases are as follows :*

1. Gives better drainage, and is therefore specially adapted to cases of vesical or intestinal fistulae.

2. Avoids abdominal scar and risk of ventral hernia.

3. Is suitable for cases of small tumors without high adhesions.

4. When properly performed it lessens the danger from shock, and is therefore suitable to cases of extreme pelvic infiltration which are inoperable, because too dangerous, by the abdominal route.

5. There is less handling of the intestines, and therefore less consequent danger of intestinal adhesions.

6. Recovery is less complicated and more rapid.

Unfortunately, the vaginal route is, for at least a very large proportion of cases, impracticable. The long, narrow virgin vagina or the vagina which has become contracted from senile atrophy may render the field of operation almost inaccessible. A very large uterus with exceptionally short, thick broad ligaments and greatly enlarged appendages, with adhesions extending beyond the reach of the finger, may also be difficult or impossible to manipulate through the vagina. Under such conditions the abdominal route is much safer.

In many cases it is well to begin the operation in the vagina and continue by that route as far as the greatest safety will permit, and then, if necessary, open the abdomen and complete the operation by the combined vaginal and abdominal method. Conversely, the abdominal section may have to be supplemented by the vaginal. The

<sup>1</sup> G. E. Curatulo. *Secrezione Interna delle Ovaie*, 1896.

combined operation may be the deliberate purpose from the beginning, or the necessity for it may become apparent only in the course of the operation.

In an uncertain proportion of cases the advantages of the two routes are so evenly balanced that either is permissible; the election must then rest with the individual bias of the surgeon. The choice of procedures has in a measure been forecast in the description of special operations already described.

Throwing aside the bias of the individual operator, whose efficiency may be greater along the route of his own greatest experience, and estimating the vaginal operation on the basis of its absolute value, there will remain a large proportion of cases in which it may be done more safely. In such cases it is the operation of election. The general proposition, therefore, is: first, operate through the vagina so far as practical—*i. e.*, when the diseased ovaries and tubes are low down near the vagina and within reach of the finger; second, operate by abdominal section when they extend high up into the abdominal cavity beyond the reach of the finger.

The frequency with which the vaginal route will serve for the entire operation will increase with the experience and practice of the operator. A dexterous vaginal operator will easily overcome difficulties which, without abdominal section, would be to the ordinary surgeon impossible.

It will be seen from the above that each method has its special advantages and disadvantages. Some of these last are less real than they seem; for example, an objection to vaginal hysterectomy is that it affords only a limited field of operation and small chance for visual control of the work. This does not necessarily appeal to the skilled operator. The danger of hemorrhage is an avoidable one if due precautions are used. Injuries to the bladder, ureters, and intestines may occur with either method, but in vaginal hysterectomy the perfect drainage makes them less dangerous if they do occur.

The operator should not permit his prejudice in favor of either route to lead him to pursue it to the extreme, for that part of an operation which is easy by the vagina is often most difficult by the abdomen, and *vice versa*.

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## CHAPTER XXIV.

URETHRITIS.—PROLAPSE OF THE URETHRA.—SUB-URETHRAL ABSCESS.—CYSTITIS.—PYELITIS.

### Urethritis.

**Etiology.** The predisposing and exciting causes are the same as for inflammation in general. Among the exciting causes the gonococcus is very frequent; gonorrhœal infection usually occurs by exten-

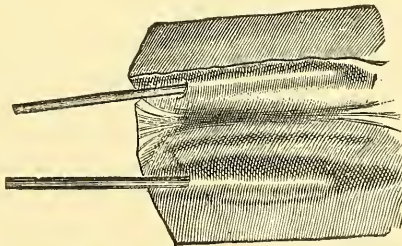
sion from the vulva or vagina. Other causes, such as syphilis, tuberculosis, erysipelas, and diphtheria, are much less common. A prolific source of infection is the unclean catheter.

**Pathology and Diagnosis.** The less virulent and milder infections are, according to Kelly, most marked in the anterior and posterior walls of the urethra. The mucosa as exposed by the cystoscope—page 72—is swollen and red from distention of the vessels, and, upon instrumental examination, may bleed. The urethral inflamed glands stand out prominently as oval, yellow spots, and in the anterior part of the urethra sometimes give forth a secretion which looks like pus, but may be only epithelial débris. The tenderness in the milder infections is less marked than in the gonorrhœal variety.

*Gonorrhœal* infection in the acute form is intense and somewhat characteristic. The swollen mucosa, at first of deep-red color and finally covered with pus, protrudes through the meatus, and has much the appearance of an inflamed, prolapsed anus. It is excessively sensitive to touch and, especially when touched by an instrument, is apt to bleed. The burning and pain on urination may be intense. Microscopic examination of the pus will show the gonococcus. The eversion usually disappears as the urethritis subsides.

*Skene's Glands.* The urethral glands of Skene are, in this connection, of great pathological significance. They consist of two glandular tubules situated one on either side of the urethro-vaginal wall. Each tubule extends, from a point just within the meatus urinarius, parallel to the urethra to a distance of about five-eighths of an inch. The tubules branch into the muscularis of the urethro-vaginal wall. They are lined with columnar epithelium. When the urethra is swollen

FIGURE 145.

Urethra laid open, glands distended by probes.<sup>1</sup>

and the meatus everted, the openings of the tubules appear just outside the urethra. The normally placed openings are seen on either side by separating the lateral labia of the meatus urinarius.

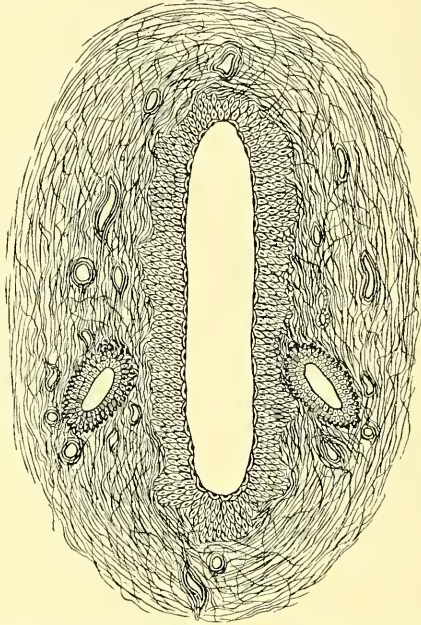
When inflamed these tubules give forth upon pressure a white, serous or purulent discharge. The mucous membrane around their openings, as in follicular pharyngitis, is swollen, thickened, and of a bright yellowish-gray color, or the orifices may be surrounded by a granular areola.<sup>2</sup> The infection involves also the peri-glandular

<sup>1</sup> Skene's Diseases of Women.<sup>2</sup> *Ibid.*, p. 614, Figure 215.



structures. The urethro-vaginal wall in the neighborhood of the tubules is usually swollen and everted. The inflammation is generally purulent, very often gonorrhœal, and may give rise to a free discharge. Occlusion of the tubules by adhesive inflammation and the consequent formation of retention-cysts is possible. There is often great tender-

FIGURE 146.

Transverse section of urethra, showing gland on each side, magnified.<sup>1</sup>

ness on pressure. Chronic infection, as a rule, gives rise to little or no pain on urination. Inflammation in these glands, until described by Skene, had been mistaken for caruncle of the urethra. The bright-red areola upon the swollen and thickened mucous membrane about the openings of the tubules closely resembles caruncle.

#### DIFFERENTIATION BETWEEN INFLAMMATION OF SKENE'S GLANDS AND CARUNCLE OF THE URETHRA.

##### *Inflammation of Skene's Glands.*

1. Urination not usually painful.
2. Two protuberances correspond to site of openings of tubules.
3. Removal of protuberances does not cure.
4. Mouths of tubules inflamed.

##### *Caruncle of the Urethra.*

1. Urination painful.
2. Usually only one protuberance situated anywhere in circumference of meatus or within meatus, but usually on posterior wall.
3. Removal cures.
4. Mouths of tubules normal.

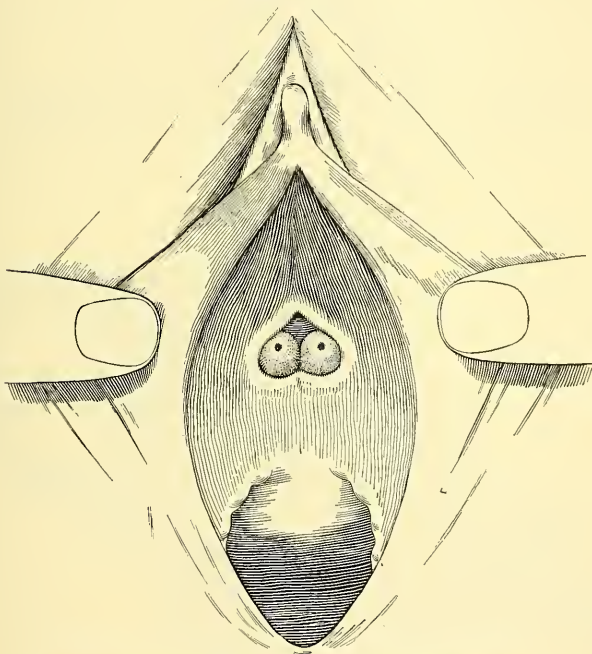
As pointed out by Howard,<sup>2</sup> the gonococcus may become intrenched

<sup>1</sup> Skene's Diseases of Women.

<sup>2</sup> Dr. H. C. Howard, Champaign, Illinois.

in these glands, as in the glands of Bartholin, and from time to time furnish the infection for recurrent gonorrhœa. Even though the disease may have disappeared from the external surface, reinfection from the glands may repeatedly occur. This source of reinfection, unless carefully sought, is liable to be overlooked. If the urethral glands are in a state of suppuration the pus may be stripped out of them by pressure of the finger and a stroking motion against the urethro-vaginal wall. The white point in Figure 149 represents a drop of pus issuing from the duct on digital pressure. Tubercular infection of the glands has been repeatedly observed.

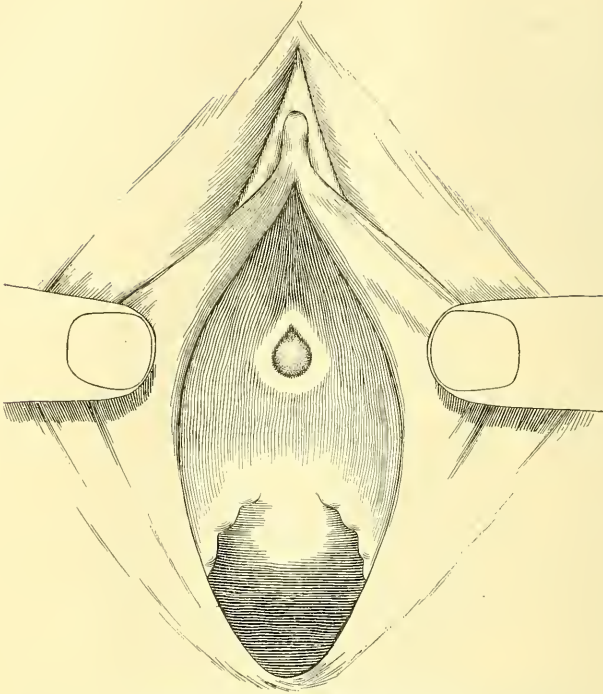
FIGURE 147.



Openings of the two inflamed tubules. Semi-diagrammatic.

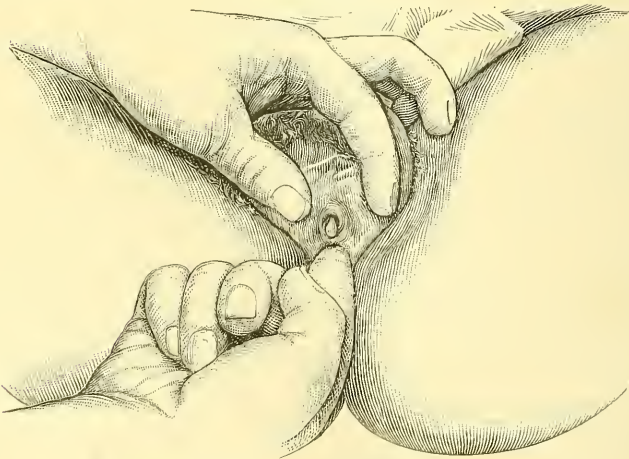
**Treatment of Urethritis.** The milder non-gonorrhœal form, if not complicated by cystitis, may usually be promptly cured by a few applications made at intervals of four or five days of 3 per cent. solutions of nitrate of silver. The application is made by an applicator wound with cotton, through a urethral speculum. Extreme forcible dilatation of the urethra has been much practised for the relief of this and the more intense forms of urethritis, and has often given prompt and pronounced relief. Permanent injury to the urethra and consequent permanent incurable incontinence of urine have, however, resulted about three times in a hundred of such dilatations. Extreme dilatation is therefore prohibited. Emmet's so-called button-hole operation, described under stricture of the urethra, answers the therapeutic indication of dilatation, and does not impair the retentive power; it also

FIGURE 148.



Urethral caruncle. Semi-diagrammatic.

FIGURE 149.

Expression of pus from the ducts of Skene's glands.<sup>1</sup>

has the advantage of rendering the diseased mucosa accessible to direct local treatment. The opening may at any time be closed by interrupted

<sup>1</sup> Howard Kelly. Diseases of the Female Bladder and Urethra. Twentieth Century Practice.

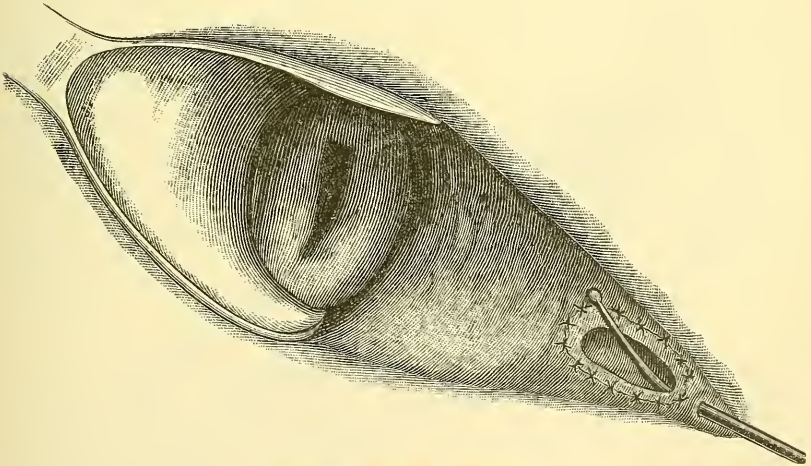


sutures, but, inasmuch as there is usually no functional impairment, the closure is seldom called for.

Gonorrhœal urethritis, if acute, is treated first by a single application of a 10 per cent. solution of silver nitrate, then by rest; compresses to the vulva, saturated with lead water and laudanum, or sedative suppositories in the rectum, may give relief. If the irritation is very great the compress may be saturated with a 5 per cent. solution of the muriate of cocaine. The medical treatment will be the same as for gonorrhœa in the male.

Chronic inflammation in Skene's glands, especially if gonorrhœal, usually resists all conservative measures. If it does not yield to the application of nitrate of silver fused on a fine probe, the entire length of the tubules should be laid open on the vaginal side, using a probe as a guide. The glandular structures are then to be destroyed by caustic or by excision with scissors, and the surfaces made to heal by granulation. To fuse the nitrate of silver on the probe, let the salt be melted in a small receptacle over a spirit-lamp, and dip the end of the probe into it repeatedly so as to coat it over with a thin layer of the salt.

FIGURE 150.

Emmet's button-hole operation.<sup>1</sup>

*Treatment of Urethral Stricture.* The inflammatory process may have been so intense as to produce contracting cicatricial tissue and consequent stricture. The cause of this uncommon lesion is usually gonorrhœa or trauma. The treatment is dilatation by means of graduated sounds, as in stricture of the male urethra. Should dilatation fail, a urethro-vaginal fistula may be made and the vaginal margins sutured to the urethral margins of the opening. When the edges have securely healed, the fistula may be closed by denudation on the vaginal surface, the interrupted silkworm-gut sutures being so placed as to give ample calibre to the restored urethra. See Figure 150.

<sup>1</sup> Emmet. American System of Gynecology, vol. ii. p. 484.

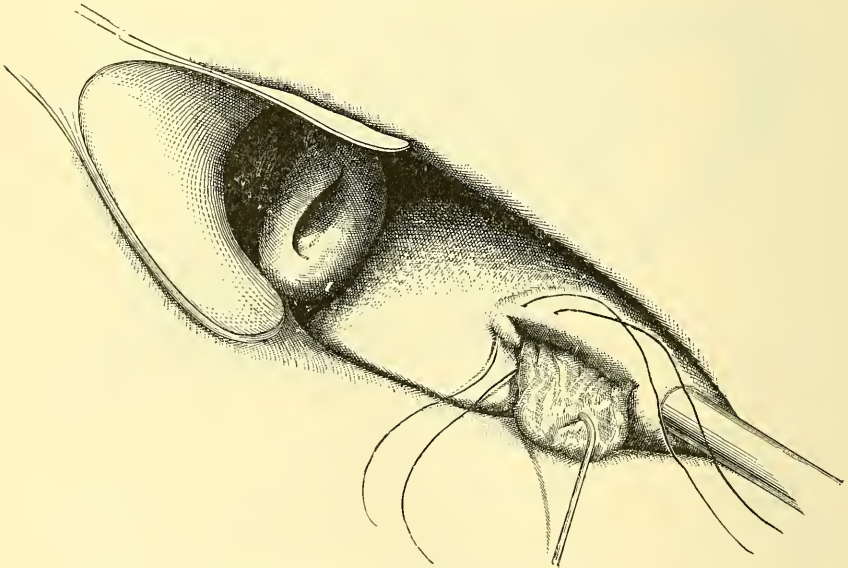
### Prolapse of the Urethra.

**Description.** Prolapse of the urethral mucosa and submucosa, with urethritis, is a condition described by Emmet.<sup>1</sup> The prolapsed mucosa projects from the upper or lower margin of the meatus or surrounds the entire outlet of the urethra. The urethra is obstructed, and as the obstruction increases there is frequent or constant urethral tenesmus. Finally the entire urethral mucosa and submucosa may be rolled out so as to resemble a greatly prolapsed anus. The urethral canal dilates, and, as the circulation is obstructed, the rolled-out structures become œdematous. Cystitis and infection of the kidney are possible results.

When the prolapse is confined to the upper or lower wall of the urethra and the outrolled tissues are from the outlet of the canal, they resemble hemorrhoids, and may, as in the operation for hemorrhoids, be removed by ligature.

When the prolapse is extensive and circular, its removal in a mass is prohibited, first, because more prolapsed tissue usually follows and promptly takes the place of that which has been removed; second, because a distressing stricture of the urethra may result.

FIGURE 151.



Emmet's operation for prolapse of the urethra.<sup>2</sup>

The Treatment of such extensive prolapse is to return the displaced mucosa, if possible, and apply urethral massage—Chapter L. If relief does not follow after a few treatments it is well to make a small artificial vesico-vaginal fistula, and thereby give the urethra perfect

<sup>1</sup> Principles and Practice of Gynecology. Adaptation.

<sup>2</sup> From Emmet's Principles and Practice of Gynecology.

rest. The massage may then become more effective. If these measures fail the prolapse may be permanently cured by making what Emmet calls a button-hole slit in the urethro-vaginal wall and drawing through this the excessive mucosa and cutting it away. The sutures for closure of the opening are introduced before the excision. During the passage of the sutures a sound should be in the urethra.

#### Sub-urethral Abscess.

**Description.** This is an abscess in the urethro-vaginal wall. It has been described by Lawson Tait<sup>1</sup> under the name urethral cyst. Its pathology is not fully explained. In the limited number of cases described the sac occupying the urethro-vaginal wall has varied in size from that of a walnut to that of a hen's egg, and has communicated, by a small opening, with the urethra. The presence of this sac has been explained by Tait as a congenital defect, and by Kelly as a retention-cyst formed by inflammation and occlusion of Skene's ducts and the subsequent perforation of the urethral wall. Inasmuch as Skene's ducts are probably the remnants of Gartner's ducts, the congenital and cyst theories may both be true.<sup>2</sup>

The tumor has the appearance of pronounced cystocele, is well defined, and very tender to the touch. Pus and ammoniacal urine often escape from it through the urethra. The tenderness is so great that anæsthesia is usually required for examination. If the communication with the urethra is exposed by a urethral speculum and pressure be made upon the sac, one may, as the sac is reduced in size, see its contents forced into the urethra.

The Treatment is to dissect out the sac-wall and close the wound with interrupted silkworm-gut sutures. These sutures at the same time should close the urethral opening. Complete anatomical and symptomatic cure follows this operation.

#### Cystitis.

In pathology and symptoms inflammation of the female bladder differs in no respect from that of the male. The peculiar sources of infection, the relative shortness of the female urethra, and the easy access to the bladder through the vesico-vaginal wall, however, give to the etiology, diagnosis, and treatment a clear gynecological significance.

**Etiology.** In addition to most of the sources of infection common to cystitis in the male, the female bladder is subject to concurrent infection from the same causes which give rise to infection of the reproductive organs. The susceptibility is increased during the recurring physiological congestion of menstruation and especially during the puerperal state. Furthermore, infection may readily spread from the reproductive to the urinary organs. Vulvitis, for example, may extend to the urethra, bladder, and ureters. Such extension to the urinary organs, however, is somewhat retarded by the fact that the urinary tract is

<sup>1</sup> Diseases of Women and Abdominal Surgery, vol. i. p. 85.

<sup>2</sup> Garrigues. System of Gynecology by American Authors.



freely washed by a downward current of urine and by the further fact that the urine, being acid, is a hostile medium for about 90 per cent. of pathogenic bacteria. A not infrequent predisposing cause of cystitis is stone in the bladder.

**Diagnosis.** The urinalysis and symptomatology are the same as for cystitis in the male. Direct inspection of the bladder through the short female urethra is much more satisfactory than through the long male urethra. See Vesical Examinations in Chapter III. As seen through the cystoscope, the infected bladder mucosa often appears coated with a thick deposit of blood or muco-purulent secretion, and may therefore be invisible. The mucous surface beneath may, however, be exposed by gently wiping off the deposit with a bit of cotton in the grasp of the mouse-tooth forceps, introduced through the cystoscope. The cystoscope, if made to sweep over every part of the bladder mucosa, will enable the examiner to observe minutely all gross appearances.

The reddening of the mucous surface will vary in degree with the intensity of the infection. The larger vessels of the healthy mucosa may appear injected, and an abundant capillary network, as seen in conjunctivitis, may fill the intermediate spaces, or the mucosa may present a uniform thickened appearance like that of bright red plush. In some cases it is in parts destroyed by ulcerative processes and broken down into débris. The shreds partially detached may remain hanging to the bladder-wall, or may separate, disintegrate, and be discharged through the urethra. Here and there may be seen raised islands of granulations secreting pus. Wherever granulating surfaces have healed there will be cicatricial bands or broad cicatricial surfaces.

The concurrence of urethral and ureteral infection with cystitis is frequent and significant. A first examination, therefore, should not fail adequately to take into the account the condition of the urethra and ureters.

It is essential in noting the state of every part of the bladder mucosa to inspect with great care the trigone, the urethra, and the mouths of the ureters. All this is done as the speculum is withdrawn. Hyperæmia or mild infection of the trigone is present in many cases of so-called irritable bladder, and should be distinguished from the more virulent infections.

**Treatment.** A mild form of cystitis localized in the region of the trigone, perchance involving a small patch of mucosa near one of the ureteral mouths, may be present in a bladder otherwise perfectly healthy. Such a mild infection may give rise to little more than hyperæmia, and yet the subjective symptoms may be so intense as to resemble those of the most virulent cystitis. The diagnosis once made by careful cystoscopy, the treatment is simple and usually most satisfactory. It is the application of a 3 per cent. aqueous solution of silver nitrate to the congested part by means of a bit of cotton grasped by a slender tooth-forceps and passed through the cystoscope. Care should be taken to confine the application to the congested area; this treatment is too severe to be made at the physician's office: it should be at the patient's house or at a hospital.

*Treatment of Acute General Cystitis* calls for rest in bed, relaxation of the bowels by means of mercurials and salines, especially the latter, non-stimulating diet, hot vaginal douches, and hot-water bags over the abdomen. Flaxseed tea, buchu, uva ursi, triticum repens, and sweet spirits of nitre are often of positive value. It is always important to give large quantities of water; this is a natural method of washing out the bladder and other urinary passages.

Washing out of the bladder is approved for general cystitis, but should not be done while the infection is so intense as to render the irrigation intolerable. The irrigation is made with warm sterilized water, to be followed with a solution of bichloride of mercury, 1 to 100,000. This may be gradually strengthened as the patient's toleration will permit. The bladder mucosa is peculiarly sensitive to solutions of ordinary strength. A 1 to 3000 solution is reported to have caused sloughing of the mucosa.

A 1 or 2 per cent. solution of nitrate of silver, followed immediately by the free injection of normal salt solution, may be of great advantage in acute cystitis; it may even be repeated daily for several days, but usually need not be long continued. The saturated solution of boric acid is also in great favor. Irrigation of the bladder in the hands of a careless or injudicious person is injurious. The necessary precautions are great gentleness to avoid wounding the hypersensitive and delicate mucosa, and extreme attention to asepsis. Neglect in either of these particulars has many times aggravated and perpetuated the infection.

*Treatment of Chronic Cystitis.* When the less radical measures have failed, cystotomy may be required; that is, an artificial vesico-vaginal fistula. The object of the operation is to secure constant perfect drainage and consequent complete rest for the bladder. Intermediate relief from intense suffering promptly follows.

*Operation.* The patient is preferably in Sims' position, with the anterior vaginal wall exposed by Sims' speculum. A large sound is introduced through the urethra, and its point pressed against the vesical mucosa in the middle of the long axis of the vesico-vaginal septum. An incision is now made upon the sound through the septum with the knife or scissors. The point of the sound will then pass through into the vagina. The opening thus made is enlarged so as to extend one inch in the median line of the long axis of the vesico-vaginal septum. Its upper end will be about one-half inch from the anterior wall of the cervix uteri, and its lower end the same distance from the neck of the bladder. The margins of the vesical and vaginal mucosa are then united by fine interrupted catgut sutures. This valuable operation is the device of Dr. T. A. Emmet.

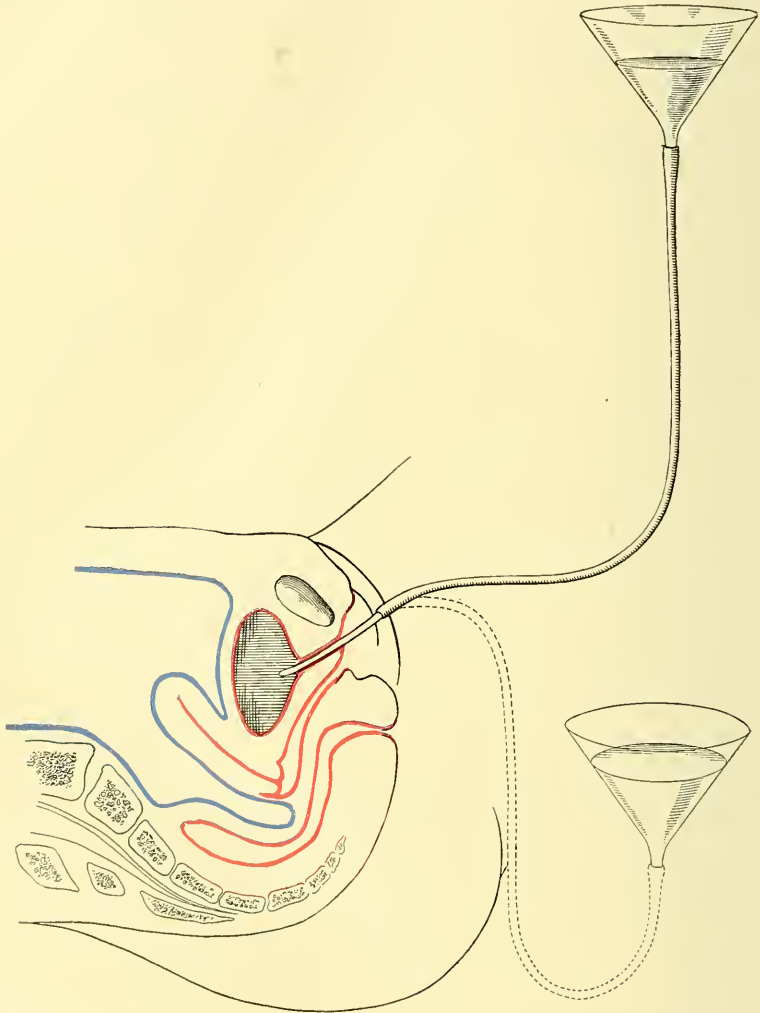
Vesico-vaginal douches thrown in through the urethra will now pass out by way of the fistula through the vulva, and direct applications may be made through the fistula to any part of the bladder mucosa.

In some of the less severe cases sufficient improvement takes place in a few months to permit the closure of the fistula, with permanent relief.

In the more chronic cases in which the bladder walls are much thickened, deeply infected, disorganized, and contracted, and particularly

when the cystitis is complicated with pyelitis and nephritis, the fistula should remain open, for its closure will inevitably be followed by relapse.

FIGURE 152.



Washing out of the bladder. The irrigation may be repeatedly made by alternately raising and lowering the funnel; when the funnel is raised the fluid flows into the bladder, when lowered it returns to the funnel.

If the cystitis be complicated by stone in the bladder the treatment should be an artificial vesico-vaginal fistula instead of a crushing operation through the urethra. The fistula is preferred for two reasons: first, the crushing operation may involve objectionable dilatation of the urethra, see page 275; second, the fistula is useful as a means of drainage for the cure of the cystitis.



## Pyelitis and Nephritis.

This topic has a special gynecological significance in the matter of diagnosis and treatment by means of the cystoscope and the ureteral catheter, which have been described in Chapter III. The ureteral catheter<sup>1</sup> is introduced into the ureter through the cystoscope. By this means one may wash out the urinary tract up to and including the pelvis of the kidney; as a result of this treatment apparent cures in cases of hydro-ureter and pyo-ureter have been recorded.

To wash out the ureter the patient is placed in the knee-breast position; the ureteral catheter, with a short piece of rubber tubing attached, filled with a sterilized boric-acid solution, and clamped to keep the solution from running out, is passed through the cystoscope into the ureter and the cystoscope withdrawn. A sterilized glass funnel, with an attached rubber tube eighteen inches long, is filled with the irrigating solution, and the two rubber tubes are connected by a small glass tube with a point sufficiently fine to fit into the tube on the catheter. By raising the funnel above the level of the body the fluid is made to flow through the ureter into the pelvis of the kidney. When the funnel is dropped below the level of the body the fluid returns; thus, by alternately raising and lowering the funnel, the fluid is made repeatedly to flow back and forth and to wash out the ureters and pelvis of the kidney. The fluid may, if desired, be changed one or more times during the treatment.

Purulent or other accumulations in the ureter should be permitted to run out through the catheter before the washing out.

The practical value of the ureteral catheter as a therapeutic agent remains to be estimated. The attempt to cure chronic infection in the uterus, nose, throat, and other mucous cavities by washing them out with various fluids has not generally been followed with great success. It is probable that the ureter and pelvis of the kidney will not be an exception to the rule. Kelly puts forth a word of wise precaution on the urgency of making all ureteral manipulations with extreme gentleness. The catheter must never be pushed up higher than it will readily pass, for such violence would injure the mucosa, and might be followed by dangerous, even fatal infection.

<sup>1</sup> Adaptation from Howard Kelly. Diseases of the Female Bladder and Urethra.

## PART III.

### TUMORS, TUBAL PREGNANCY, MALFORMATIONS.

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#### CHAPTER XXV.

##### TUMORS OF THE VULVA AND VAGINA.

Varix.	Fibromyoma.
Hæmatoma.	Lipoma.
Elephantiasis.	Lupus.
Papilloma.	Enchondroma.
Carcinoma.	Neuroma.
Sarcoma.	Cysts.

##### Varix.

Varix is an aggregation of dilated or varicose veins in the erectile tissue of the bulbi vaginae. The varicose state is caused by obstruction to the circulation. This obstruction often arises from direct pressure upon the venous trunks by the gravid uterus. The pressure may be exerted by tumors or by inflammatory exudates. Habitual constipation, portal obstruction, and visceral disease may underlie and perpetuate the disorder; it belongs rather to advanced than to early life.

The tumor is oval, globular, or serpentine, and may grow to the size of a child's head.<sup>1</sup> The surface is irregular and of dark-blue color. The mass temporarily disappears on pressure. The subjective symptoms include a variable pruritus and, especially on walking or standing, a sensation of fulness and weight. Rupture of the distended veins often occurs during parturition; it may be the result of traumatism, or may be spontaneous. External rupture may cause dangerous, even fatal, hemorrhage. Subcutaneous rupture into the cellular tissue gives rise to an accumulation of blood called hæmatoma.

The Treatment includes mechanical support of the uterus, if displaced, regulation of the bowels, removal of waist constriction, the application to the varix of a pad held in place by a T-bandage, the use of astringent lotions, and, especially during pregnancy, frequent rest. The radical surgical treatment is the same as would be indicated by the general principles of surgery for varix in any other location.

<sup>1</sup> Holden. New York Medical Record, July, 1868.

## Hæmatoma.

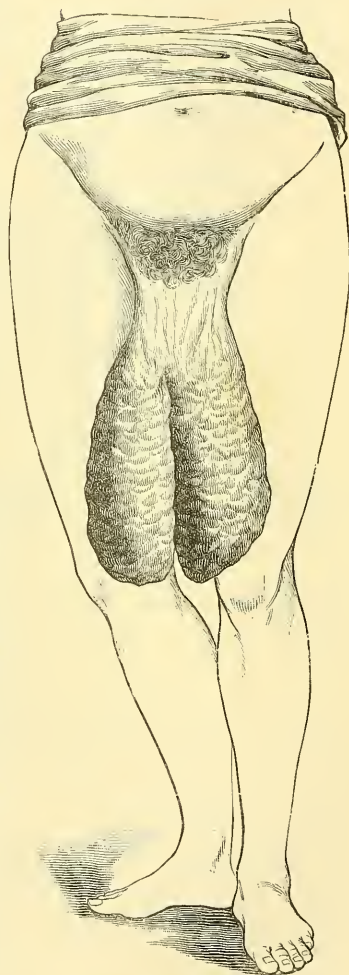
The Causes have been outlined in the foregoing paragraphs on varix, and in the section on Traumatism, Chapter XXXIX. The tumor may develop rapidly or slowly to the possible size of an orange, is commonly unilateral, globular, elastic, and of a violet color. It is distinguished from pudendal hernia by the absence of impulse on coughing and by its non-reduction on taxis; it may terminate by absorption or by suppuration, or the blood-clot may become encysted. The treatment in the early stage is to arrest bleeding by means of pressure and the ice-bag. If an abscess develops it should be freely opened and drained. A cyst-wall, if formed, should be dissected out and the wound closed by deep sutures.

## Elephantiasis.—Pachydermia.

This disease is primarily a chronic recurring lymphangitis. It is associated with hyperplasia of the connective tissue, skin, mucous membrane, and epidermis. The whole process results in the formation of a tumor, often of large size, and is most frequent between the years of puberty and the menopause. It is rare in temperate, common in tropical climates, and epidemic in certain low-lying countries along seacoasts and in the islands of the tropics. An organism called the *filaria sanguinis hominis* has been found in the blood- and lymph-vessels of the affected part, and is believed to be the exciting cause.<sup>1</sup> The tumor may involve the whole or a part of the vulva, most frequently the two labia majora, less frequently the clitoris, and least frequently the nymphæ.

The growth, when large, is apt to be quite pendulous. Its surface may be smooth, rough, fissured, warty, or ulcerated. The tumor, especially if ulcerated, gives forth a sero-albuminous exudate. This may be so profuse as to demand frequent change of clothing. Ulceration is common as the result of friction. Cases of twenty years' dura-

FIGURE 153.

Elephantiasis of vulva.<sup>2</sup>

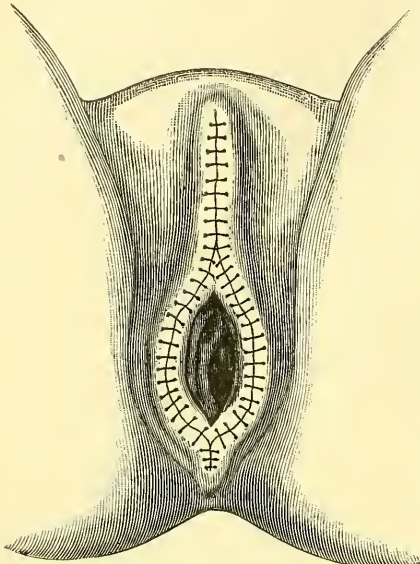
<sup>1</sup> Delafield and Prudden's Pathological Anatomy and Histology. Fifth edition, p. 140.

<sup>2</sup> From Bonnet and Petite, Gynecology.



tion have been recorded. The enlarged labia may reach the enormous weight of fifty pounds. Both labia are simultaneously involved. The

FIGURE 154.



Appearance of the vulva after operation for elephantiasis.<sup>1</sup>

inguinal glands on both sides are enlarged. Chyluria is a frequent complication. The disease does not directly impair the general health; it is, however, disabling from its mechanical interference with urination, walking, and coitus.

The Differential Diagnosis from papilloma, carcinoma, sarcoma, fibroma, and lipoma depends upon the clinical history as outlined in the foregoing paragraphs, and upon the microscopic findings. All these growths differ from elephantiasis in the absence of any induration of the surrounding skin. Lupus presents more extensive ulcerations, deeper induration, darker color, and has for its essential factor the tubercle bacillus.

The Treatment is excision. The numerous dilated lymph channels increase the danger of

septic absorption and, in the operation, render the most extreme asepsis imperative.

#### Papillomata, Condylomata, or Warts.

These growths are characterized by hypertrophy of the papillæ of the skin or mucous membrane, increase of connective tissue, and thickening of the epithelial covering. They are divided into three general classes:

1. Non-specific—simple papillomata—ordinary warts.
2. Gonorrhœal—condylomata acuminata—pointed condylomata—specific vegetation or venereal warts.
3. Syphilitic—flat condylomata.

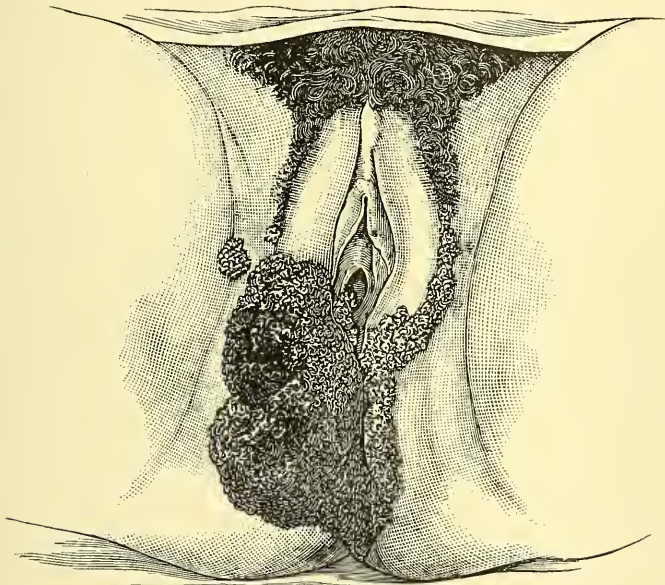
*Non-specific, Simple Papillomata*, or ordinary warts, are not uncommonly found on the mons veneris—less frequently on the labia. They are of unknown origin, usually of dark-brown color, are not deeply divided, may have a broad base or may be pedunculated, and are not apt to coalesce into large, compact masses. The treatment is excision with the sharp curette and cauterization of the base.

*Gonorrhœal Warts*, or warts at least associated with gonorrhœa, are found on the vulva, vagina, cervix uteri, perineum, and about the anus. Zeisler, in a verbal communication to the writer, says that the

<sup>1</sup> Bonnet and Petite, Gynecology.

part played by the gonococcus, except as a predisposing cause, is doubtful. These warts occur singly, in groups, or in cauliflower-like masses. The growth may be so large as to interfere with coitus, urination, or defecation. The surface is soft, moist, of bluish color, and divided into small nodules with pointed ends like a cock's comb. When the growth occurs during pregnancy it is rapid, but may immediately disappear after labor. There is usually a coexistent fetid vaginitis. The question has been raised whether this form of condylomata may not occur independently of the gonococcus, but the clinical evidence, including bacteriological studies, strongly points to at least a coexistent gonorrhoea.

FIGURE 155.

Simple warty vegetations of the vulva.<sup>1</sup>

The treatment includes, first, thorough cleansing and disinfection of the affected region; second, the removal of the so-called vegetation with scissors and cauterization of the base; third, antiseptic dressing and washes until the parts have healed. The danger of puerperal sepsis and ophthalmia of the newborn infant strongly suggests radical measures during pregnancy.

*Flat Condylomata*—modified mucous patches—are of syphilitic origin and may involve large surfaces of the vulva and vagina. They are soft, grayish, have a broad base, and yield to antisiphilitic treatment.

#### Carcinoma of the Vulva.

Carcinoma of the vulva is rare, and is apt to be of the pavement variety—epithelioma. The author has observed one case of cylin-

<sup>1</sup> Tarnier, in Pozzi's Treatise on Gynecology.

drial carcinoma immediately after the removal of a cancerous uterus. In this case the disease was doubtless transplanted from the uterus during the operation. Its prompt excision was followed by radical cure.

*Pavement Carcinoma* begins as a small, hard, whitish, rough, and painless papillary excrescence, situated at any point on the vulva, but more commonly on the sulcus between the labia majora and minora. There is first a gradual involvement of the superficial structures around the growth, then rapid ulceration and pain. The inguinal glands on the side corresponding to the disease are involved. The margin of the ulcer is elevated, hard, and of a bluish-red color. The base is granular and covered by a semi-opaque, putrid secretion. Small, pearly bodies may often be squeezed out from the base. These are epithelial nests, and are highly diagnostic. The labium becomes greatly infiltrated, very hard and thickened, and is finally destroyed by ulceration. The discharge is very foul and malodorous. The disease rarely extends to the opposite labium, vagina, or abdominal wall. It may invade the perineal and peri-anal regions. Epithelioma of the lip and of other parts where skin and mucous membrane meet offers a close analogy to epithelioma of the vulva.

*The diagnosis* is chiefly from lupus and syphilis. Unlike cancer, lupus is recognized by the insignificance of the pain, by the relative freedom from foul secretions, by the tendency of the ulcers to cicatrize, by the slight liability of extension to the inguinal glands, and by its slow progress. Epithelioma destroys life in about two years after the beginning of ulceration. Syphilis may be recognized by the history of infection, by the presence of secondary and tertiary lesions elsewhere, and by the effect of specific treatment.

*Cylindrical carcinoma* may be soft or hard. The relative proportion of epithelial elements to the connective tissue is greater in the former, less in the latter. The tumor begins more deeply in the cellular tissue. It is characterized by irregular-shaped cylindrical cells embedded in the meshes of connective-tissue fibres. Progress is more rapid than in epithelioma. The tumor more rapidly breaks down, the hemorrhage is frequent and profuse, the ichorous discharge is abundant, the inguinal glands are early enlarged, and systemic effects appear earlier and are more marked. The disease terminates in sepsis and marasmus. Death occurs earlier than in epithelioma.

*The treatment* is radical excision before glandular involvement.

### Sarcoma of the Vulva.

This tumor, of mesoblastic origin, is so rare in the vulva as to preclude accurate description. The varieties are: first, the round cell; second, the spindle cell; third, myxosarcoma; fourth, melanosarcoma. They preferably develop in the labia majora, but have been found in the nymphæ. The growth, according to the variety, may be slow, resembling that of lipoma,<sup>1</sup> or ulceration may be early, rapid, and destructive.<sup>2</sup> The usual characteristics of sarcoma of the vulva are

<sup>1</sup> Henkel.

<sup>2</sup> Hildebrandt.



rapid growth, late ulceration, variable hemorrhages, and late involvement of the inguinal glands. The systemic breakdown, though more rapid and marked, resembles that of carcinoma. All recorded cases have terminated fatally. Death usually results from rapid involvement of distant organs through the venous current.

The Treatment is removal at the earliest possible date. The author here records a successful operation done fifteen years ago for the removal of a spindle-cell sarcoma of the mons veneris. There has been no recurrence.<sup>1</sup>

#### Cysts of the Vulva.

The pathology of cysts of the vulvo-vaginal gland has been explained in Chapter XI. under Inflammation of Bartholin's Glands. The only satisfactory treatment of such a cyst is to open the sac, dissect out the sac-wall, and close the wound with sutures.

#### Fibromyoma of the Vulva.

Fibromyoma belongs to the connective-tissue group of benign tumors, and is therefore of mesoblastic origin. It is composed of fibrous connective tissue and a variable amount of muscular fibres. The histological characters of this tumor will be given more fully under the subject of Fibromyoma of the Uterus. The tumor is commonly small, and, when large, is apt to be pedunculated; it is smooth, irregular, or lobulated, is not adherent to the skin, and, according to the amount of fluid in the interspaces, may be hard or soft; it is often ulcerated from friction and rarely is the seat of an abscess. The symptoms are mechanical, and are due to weight and pressure. The treatment is excision.

#### Lipoma.—Fatty Tumor of the Vulva.

This tumor is composed of lobuli of adipose tissue in a fibrous meshwork, and originates in the fatty tissue of the labia majora and mons veneris. It is distinguished from fibromyoma by the greater rapidity of growth, by the lobulated surface, and by a peculiar sensation to the touch. This sensation is such as would be expected from a wad of cotton under the skin. Lipoma may grow to the weight of ten pounds and may extend to the knees. The treatment is excision.

#### Tuberculosis.—Lupus of the Vulva.

This disease, from the pathological point of view, would be classed as tubercular inflammation of the vulva. The tumor-like mass, however, presents physical characteristics in common with certain tumors; hence, from the clinical and comparative stand-point, the subject belongs here.

Tubercular vulvitis, commonly called lupus, is rare. It occurs in the vulva, usually during the period of maturity. The two charac-

<sup>1</sup> The microscopic examination was by Dr. Lester Curtis, Chicago.

teristic lesions are, first, the formation of tubercles and nodules, which undergo cheesy or colloid degeneration and, finally, ulceration and cicatrization; second, a variable increase throughout the affected area of connective tissue.

The ulcer is of red color, with a granular base. It may be superficial or so deep as to make permanent fistulæ between the bladder, vagina, and rectum. The cicatricial contraction which follows the ulceration may even result in strictures of the urethra, vagina, or rectum. The ulcers create pus and have a tendency to bleed.

The hypertrophic process may or may not be associated with ulceration. The general thickening and induration of the affected part may be so extensive as to give the labia the appearance of marked elephantiasis. The vulva and perineum become studded with nodules of red or violet color.

Great chronicity and little pain are notable characteristics of the disease. The general health may continue unimpaired for many years. There is usually a history of tuberculosis antedating that of the vulva. Primary lupus vulvæ is rare. Spontaneous recovery seldom occurs.

The treatment should be radical. Early excision of the diseased part together with a layer of healthy tissue around it gives good promise of permanent cure. If too late for this, the ulcerated parts should be treated by sharp curettage and the actual cautery.

#### Enchondroma and Neuroma of the Vulva.

Enchondroma and neuroma are surgical curiosities. Simpson<sup>1</sup> has reported the only authentic case of neuroma. Schneevogt and Bartholin have each recorded a case of enchondroma.

#### Cysts of the Vagina.

Vaginal cysts, although rare, are the most frequent of the tumors originating in the vagina. They are probably from the embryonal remains of Gärtner's ducts.<sup>1</sup> An echinococcus cyst<sup>2</sup> has been reported. Embryonal vaginal cysts are usually not larger than a walnut, although Veit has reported one as large as a fetal head.<sup>3</sup> They are circumscribed, tense, elastic, rarely pedunculated, and commonly unilocular; they occur singly or, in rare instances, are arranged in groups of two, three, or four in a row. The cyst-wall is composed of fibrous tissue, with an inner lining of cylindrical or pavement epithelium and an outer covering of vaginal mucous membrane. The contents are commonly viscid, transparent, and of a pale-yellow color. The occasional chocolate color is explained by the presence of blood, pus, and epithelial cells.

The differential diagnosis is from cystocele, rectocele, emphysematous vaginitis, and vaginal hernia. Cystocele is demonstrated or excluded by the sound in the bladder and the finger in the vagina; rectocele by

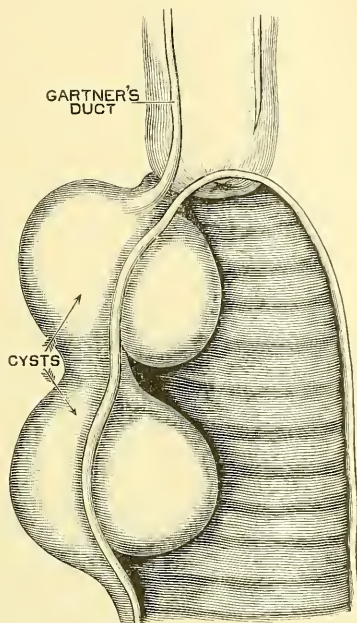
<sup>1</sup> Veit. *Krankheiten der weibl. Geschlechtsorgane*, 1887, p. 544, in *Virchow's Handbuch der spec. Pathol. und Ther.*, Ed. vi.

<sup>2</sup> Porak. *Arch. de Tocologie*, 1884, p. 163. Pozzi. *Medical and Surgical Gynecology*.

<sup>3</sup> Pozzi. *Medical and Surgical Gynecology*.

one finger in the rectum and another in the vagina. The cysts of emphysematous vaginitis contain gas, are usually multiple, and do not follow the course of Gärtner's ducts. The hernial tumor temporarily disappears on pressure and gives an impulse on coughing.

FIGURE 156.



Anterior portion of a cow's vagina, showing two large cysts developed in the terminal segment of Gärtner's duct.<sup>1</sup>

The treatment is excision, if the cyst is within easy reach ; if very close to the rectum, bladder, or ureters, the vaginal side should be removed, the remainder curetted or cauterized, and the wound packed with gauze.

#### Fibromyomata of the Vagina.

These tumors differ in no essential point from similar growths of the vulva and uterus. They are of rare occurrence, usually small, but sometimes are large enough to give the mechanical symptoms of pressure and weight. The treatment is enucleation.

#### Carcinoma and Sarcoma of the Vagina.

Carcinoma of the vagina usually occurs by extension from primary carcinoma of the cervix, uterus, or rectum ; it seldom originates in the vagina. Sarcoma of the vagina is almost unknown. The treatment, early excision, gives most unsatisfactory results.

<sup>1</sup> From Sutton : Tumors, Innocent and Malignant.



## CHAPTER XXVI.

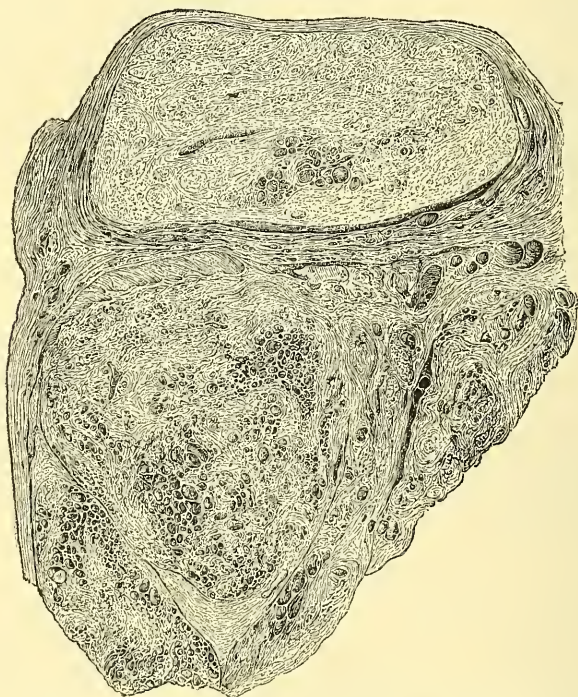
## TUMORS OF THE UTERUS.

## MYOMA.

Etiology, Histology and Histogenesis, Classification, Symptoms, Diagnosis, Differential Diagnosis, Prognosis.

THIS tumor, like the uterus, is composed of fibrous connective tissue and non-striated muscle fibres. It is the most common and one of the most important of all uterine tumors.

FIGURE 157.



Cross-section of a vascular myoma, showing cavernous sinuses.<sup>1</sup>

## Etiology.

The causes of myomata are not definitely known. Their development belongs to the age of sexual maturity: they rarely if ever occur before puberty or after the menopause, and are more frequent in the negro than in the white race. Heredity is a strong etiological factor.

<sup>1</sup> Virchow, in Sutton's Tumors, Innocent and Malignant.

**Pathological Anatomy.** The tumor is usually sharply circumscribed, single or multiple, hard or soft, of pinkish or whitish color, commonly of slow growth, and in size varies within the widest possible limits. On cross-section the gross appearance is glistening and may be homogeneous, but more usually the cut surface is striated with dense fibrous septa which divide the section into lobules. The spaces between the septa are filled with muscle fibres. See Figure 162. In later development a loose, fibrous capsule is formed which sharply defines the growth from its surroundings.

The bloodvessels of the fibrous capsule penetrate through the septa to the muscle cells. These growths are occasionally subject to extensive venous obstruction and to consequent dilatation of their veins. This often leads to the formation of cavernous spaces; hence the blood-supply, not only in different tumors, but at different times in the same tumor, is subject to great variation. This changeable blood-supply accounts for corresponding variation from time to time in the size of a tumor. Hard, white tumors of a slow growth, containing a relatively large amount of fibrous tissue, are apt to have a limited blood-supply. On the other hand, the soft, pinkish tumor of more rapid growth, with a relative preponderance of muscle cells, is always more vascular.

#### Histology and Histogenesis.

The characteristic cell elements are non-striated fusiform muscle fibres with elongated nuclei. These fibres cross one another in all directions; hence the bloodvessels cannot, as in the myometrium, run parallel with the muscle fibres, but necessarily cross them at all angles. The vessels are therefore specially liable to constriction from the contractile muscle fibres. This arrangement is so unfavorable to nutrition that in some tumors the muscular elements either undergo atrophy or fall short of full development. The fibrous element, on the other hand, being nearer to the ultimate blood-supply and being more prolific, may increase disproportionately. This partly explains the great variation in the relative quantity of muscular and fibrous tissue—a variation which ranges from a tumor composed almost wholly of muscle fibres to one entirely composed of fibrous tissue. Such a tumor is called a fibroma.

Nothing is known of the histogenesis of these tumors save their origin in the myoblast. This source, regardless of secondary changes which may modify the relative quantity of the muscular and connective tissue, stamps them as myomata. Terms like leiomyoma, fibromyoma, and fibroma should be used only to designate special characteristics. The tumor does not lose its identity as a myoma even though its muscular elements have been replaced by fibrous tissue.

*Leiomyoma, Fibromyoma, and Fibroma.* The soft, vascular tumor described in a foregoing paragraph, because it contains a large amount of muscular tissue, has been called a *leiomyoma*. The hard, more fibrous myoma is often called a *fibromyoma* or a *fibroma*. There is no definite line between the so-called leiomyoma and fibromyoma. The terms are therefore, to an extent, arbitrary and to be used only for convenience.

FIGURE 158.



x 220

Structure of a myoma. Wavy bands of long spindle-cells with rod-shaped nuclei. At one point some cells are divided transversely. Magnified.<sup>1</sup>

### Secondary Changes.

The secondary changes common to uterine myomata are as follows :

Fatty degeneration.	Septic infection.
Mucoid and other cystic degenerations.	Malignant changes.
Calcification.	

**Fatty Degeneration** pertains to the muscle fibres, and may result in their complete destruction. The blood-supply may then in a measure be crushed out by the contraction and solidification of the fibrous connective tissue, and the tumor, deprived of nutrition, will shrink to a very hard, small rudimentary mass. This process may be local or general; it is specially liable to occur in rather small tumors as a part of the atrophic changes of the menopause; hence numerous spontaneous cures at this period.

**Mucoid Degeneration** is prone to occur in large fibromyomata. The fibrous tissue is converted to a mucin substance resembling the vitreous humor of the eye. The conversion of the tissue substance to mucin is preceded by œdema and by rapid increase in the size of the myoma. Sections of the tumor which form the boundary of the softened spaces show every gradation from fusiform cells to those of the irregularly-branched, spider-like shape to which the term *myxoma* has been given. The process may result in the formation of numerous small cysts, or the tumor may be converted into a large spurious cyst having for its wall the fibrous capsule of the original myoma. This is called a *fibrocystic tumor*.<sup>2</sup>

œdema may cause so much dilatation of the lymph spaces as to give the whole tumor an appearance of marked cystic degeneration. The

<sup>1</sup> American System of Gynecology.

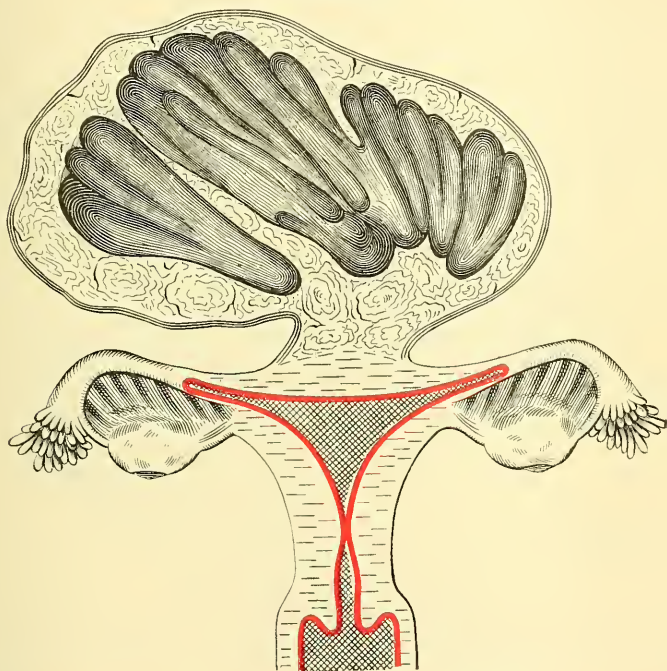
<sup>2</sup> Bland Sutton. Tumors, Innocent and Malignant, p. 133.



dilated cavernous veins already described may be converted into blood-cysts.

Calcification occurs most frequently in subperitoneal tumors, both large and small. The process may be general or local, and may pertain to the fibrous septa or to the capsule. Exceptionally the entire tumor is displaced by lime salts and converted into a stone—so-called womb-stone. A section of such a stone made by the saw will sometimes take a high polish. The whole arrangement of the fibrous septa and capsule will then appear reproduced in the lime salts, and will identify the tumor. Usually the spaces between the fibrous septa

FIGURE 159.



Fibrocystic myoma uteri. The interior of the tumor shows the fibrocystic changes.

do not calcify, but disappear by some other degenerative process. This gives the calcified part a porous, worm-eaten appearance or coral-like form. When the calcification is chiefly or wholly in the fibrous capsule the tumor is covered by a thin, hard crust which may closely resemble the foetal skull. In the enucleation of such a tumor from the corpus uteri the writer once found a calcified capsule which, through the overlying peritoneal and subperitoneal structures, felt so much like a foetal head—sutures, fontanelles, and all—that for fear of pregnancy he was almost led to abandon the operation.<sup>1</sup>

**Septic Infection.** A myoma which has for years given rise to no

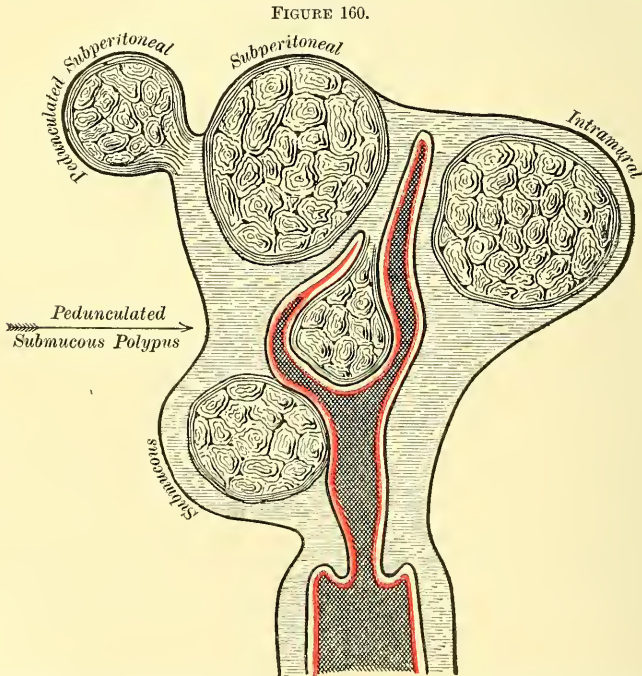
<sup>1</sup> This tumor occurred in the practice of Dr. Gourley, Downer's Grove, Illinois. The case was reported to the American Gynecological and Obstetrical Journal, 1896.

inconvenience may suddenly become infected. This will cause rapid increase in size, high pulse and temperature, great pain, and other evidences of septicæmia. The mode of infection is sometimes undetected, but usually explained by the presence of one or more of the usual causes of pelvic inflammation. The electrode and the unclean intra-uterine sound are potent causes. External violence often precedes the infection. Oöphorectomy performed for the purpose of anticipating the menopause, osmosis of fluid and gas from an adherent intestine or bladder are probable sources of infection. A fatal result is almost inevitable unless the diagnosis is made early and the tumor removed.<sup>1</sup>

Malignant Changes due to carcinoma and sarcoma will be considered under those subjects, Chapters XXIX. and XXX.

Classification.

Location. The tumor may be anywhere in the uterine substance, but in the majority of cases it is in the body of the uterus. Tumors of the cervix uteri are apt to be small, those of the corpus larger.



Intramural, submucous, and subperitoneal myomata. A pedunculated subperitoneal myoma is sometimes called extra-uterine myoma. A pedunculated submucous myoma is called intra-uterine polypus.

The following classification has been made from the anatomical, pathological, and clinical points of view.

<sup>1</sup> Sutton. Tumors, Innocent and Malignant, p. 135.

Intramural myomata.

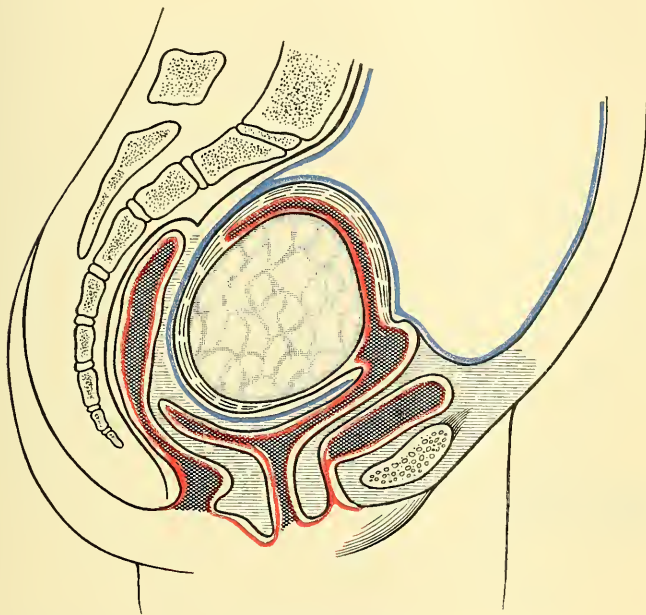
Subperitoneal myomata.

Submucous myomata.

Cervical myomata.

*Intramural Myomata.* Any neoplasm situated in the muscular wall of the uterus—that is, in the myometrium—is an intramural tumor. It may be anywhere between the mucous lining and the serous covering.

FIGURE 161.



Submucous myoma.

Sometimes a growth, which to external examination appears to be one tumor, on section proves to be a group of two or more distinct tumors, each having its own capsule. The intramural tumor is wholly surrounded by the muscular wall of the uterus; this accounts for its greater blood-supply and for its more rapid growth. It is usually firm, sharply defined, and encapsulated; but may be soft, ill defined, and without a definite capsule. The tumor will always irritate the surrounding muscular tissues, and cause them to contract upon it. If it is nearer to the endometrium than to the peritoneum, the preponderance of muscular tissue on the peritoneal side will slowly force it toward the interior of the uterus and tend to make of it a submucous tumor. If the preponderance of muscular tissue is between the tumor and the endometrium, the direction of least resistance will be toward the peritoneum and the growth will tend to become subperitoneal.

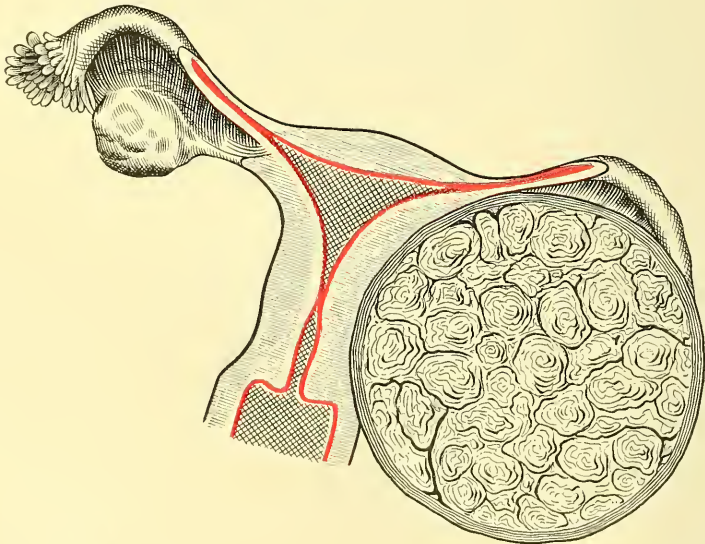
*Submucous Myomata* may originate in the muscular tissue of the mucosa, and be, therefore, primarily submucous, or an intramural tumor may, as explained in the foregoing paragraph, become second-



arily submucous. The secondarily submucous tumor is apt to remain sessile—*i. e.*, it has little tendency to the formation of a pedicle. The primarily submucous tumor, on the contrary, especially if it becomes large, always has a pedicle. A pedunculated myoma, if small, is one form of polypus.

These growths are vascular, soft, and commonly single. They originate usually in the corpus, rarely in the cervix uteri. Their size varies within wide limits; hence by their presence the uterine cavity may become enormously distended. Uterine contraction, moreover, may force the tumor through the cervix uteri into the vagina, and sometimes the pedicle, by this downward force, becomes so elongated that the extruding mass is even forced through the vulva. Inversion of the uterus is the occasional result of the downward traction upon the fundus uteri of the extruding submucous tumor. The pedicle may be constricted by pressure of the cervical canal, or may become twisted. This would cause œdema, and might, by cutting off the circulation, result in gangrene of the tumor. Gangrene might be followed by detachment and spontaneous cure. Usually, however, the extruded mass remains, and, in consequence of the œdema, gangrene or prolonged uterine hemorrhage becomes a menace to health or a destroyer of life.

FIGURE 162.

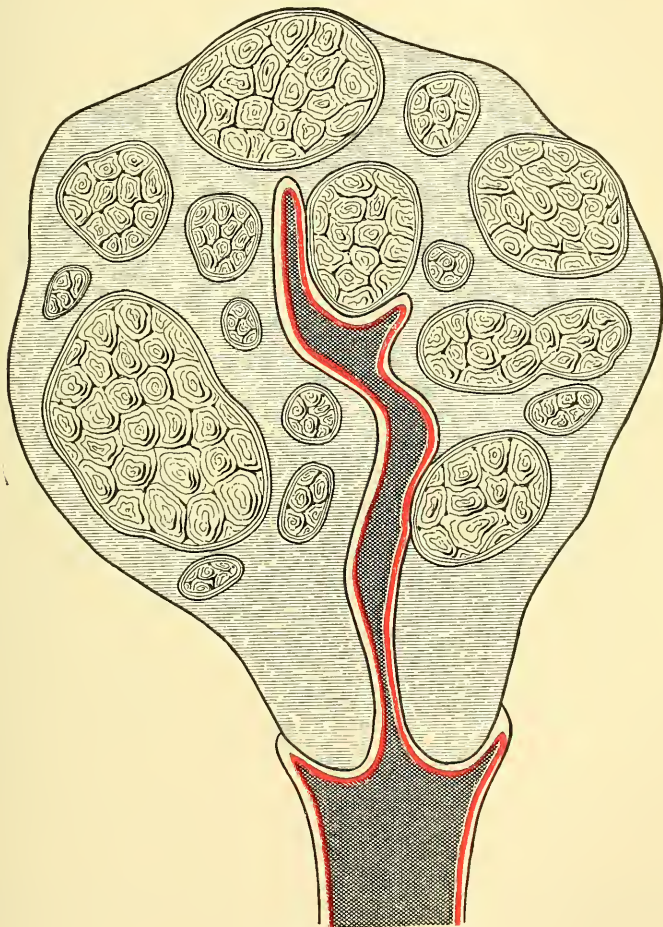


An intraligamentous myoma uteri.

*Subperitoneal Myomata*—sometimes called subserous—may be either single or multiple, and occasionally reach the enormous size of forty or fifty pounds. Such a tumor may work its way some distance

from its point of origin between the folds of the broad ligament and become an intraligamentous myoma uteri.<sup>1</sup> The subserous tumor bears the same relations to the peritoneum that the submucous myoma bears to the endometrium—*i. e.*, it may have been primarily subserous, or an intramural tumor may have been forced outward by uterine contractions until it has become secondarily subperitoneal. A tumor primarily

FIGURE 163.



Multiple myomata.

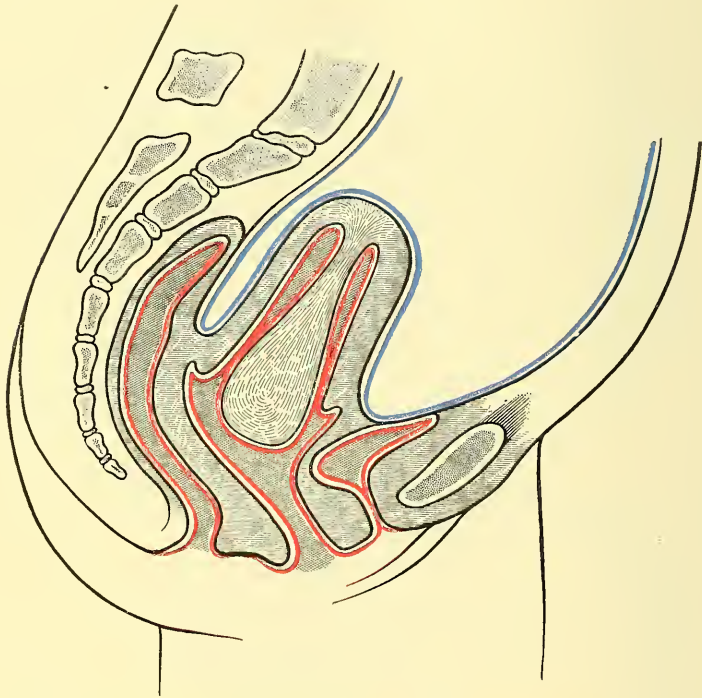
subperitoneal, if of large size, is pedunculated; if secondarily subperitoneal, it is more apt to remain sessile. A pedunculated subserous tumor may, in rare cases, become detached from the uterus and remain as a migrating tumor, free and harmless in the abdominal cavity, or

<sup>1</sup> Delafield and Prudden. Pathological Anatomy and Histology, fifth edition, p. 710.

may receive its nutrition through new adhesions which have formed between it and some of the pelvic or abdominal viscera.

*Myomata of the Cervix Uteri* are of rather infrequent occurrence. They follow the same law as to development and location as myomata of the body of the uterus. Subserous growths may spring from the supravaginal portion of the cervix. Myomata rarely appear on the vaginal portion. A submucous cervical myoma is usually pedunculated. It may have the appearance of a uterus inverted into the vagina. See Inversion of the Uterus. An interstitial cervical myoma

FIGURE 164.



Submucous polypoid myoma resembling an inverted uterus.

causes by its presence thickening of the cervical wall around it, and by pressure and stretching a corresponding thinning of the opposite wall.

#### Symptoms.

The chief symptoms may be described under the following heads :

Hemorrhage. Congestion. Pain and discomfort.  
Pressure and traction. Miscellaneous symptoms.

Hemorrhage, the most important and the most pronounced symptom, begins *not* as a sudden, profuse flow, as in carcinoma, but as a



gradual increase in menstruation; the bleeding occurs frequently, is prolonged, and from ordinary conditions, such as exercise or coitus, is easily excited. The irritating presence of the tumor sets up a hemorrhagic endometritis, and the hemorrhagic area is the endometrium, not, as sometimes supposed, the tumor itself. Nor is the hemorrhage specially confined to the mucons covering of the tumor. Fatal hemorrhage, however, has occurred from rupture of a bloodvessel in the growth.<sup>1</sup>

The degree of hemorrhage depends upon the location of the tumor relative to the endometrium and the peritoneum. The closer its relations to the uterine mucosa, the greater the hemorrhage; the nearer to the peritoneum, the less the hemorrhage; hence menorrhagia is almost invariable with the submucous variety, less severe, but very common with the intramural, and usually slight or absent with the subperitoneal. The pedunculated submucous and the pedunculated subperitoneal myomata stand at the two extremes, the former producing the greatest hemorrhage, the latter none at all.

The presence of a myoma often delays, prolongs, or prevents the menopause. The tumor, however, may participate in the atrophic processes of this crisis, and become much smaller, or may even disappear. Sometimes the menopause has the opposite effect—*i. e.*, great and sudden increase of growth. This is a strong indication for myomectomy or hysterectomy.

Pressure and Traction cause numerous mechanical disturbances of the rectum, bladder, ureters, urethra, and of the uterus itself. Among these are hemorrhoids, constipation, rectal and vesical tenesmus, mucous diarrhœa, frequent urination, dysuria, retention of urine, and uterine displacements. Pressure upon the venous trunks often causes great dilatation of the veins and passive congestion throughout the pelvis. This necessarily impairs the nutrition of the pelvic organs. Occlusion of a ureter by pressure has caused hydronephrosis.<sup>2</sup>

A myoma in the anterior uterine wall, even though small, may, by pressure, cause extreme vesical irritation. This is often the cause of cystitis. Suppression of urine from pressure or traction, especially if an unclean catheter be used, is another cause of cystitis. Frequently a myoma becomes incarcerated under the promontory of the sacrum and continues to grow there. The pressure symptoms, unless the tumor is spontaneously or manually forced up into the abdominal cavity, will then be intense. In such a case there will be not only great pain and interference with functions in the pelvis, but also in the thighs and legs.

Uterine displacements may result from pressure, traction, and increased weight. A tumor situated above, below, to either side, in front, or back of the uterus may force it in the opposite direction, or may draw it by traction in the same direction, or, by increasing the weight of the uterus, may cause prolapse. A myoma, for example, which has grown too large for the pelvis to hold it, and has therefore risen into the abdomen, will cause by traction upward displacement.

<sup>1</sup> Duncan. Edinburgh Medical Journal, 1867, p. 634—Pozzi.

<sup>2</sup> Murphy. London Journal of Medicine, October, 1849. From Pozzi.

Pain and Discomfort have been partially described in the foregoing paragraphs under Pressure and Traction. Backache, bearing-down, dragging sensations in the pelvis, and painful uterine contractions, are familiar subjective symptoms. Expulsive contractions of the uterus upon a mural or submucous myoma, especially during the period of menstrual congestion and irritation, may be transient or constant, moderate or severe.

**Miscellaneous Symptoms.** Intermenstrual uterine discharges usually occur in the progress of the disease. They may be purulent or serous, or both, are commonly mixed with blood, and are often profuse and exhausting. The watery discharge—hydrorrhœa—so commonly associated with malignant disease, is very infrequent; when present it is more transient and less offensive than in cancer or sarcoma. Dysmenorrhœa is common.

### Diagnosis.

Uterine myomata, unless very small and associated with metritis, are usually not difficult to recognize. The symptoms outlined in the foregoing paragraphs, although diagnostic, are far from pathognomonic. The diagnosis will always depend upon the physical signs; that is, upon inspection, palpation, conjoined examination, and exploration of the uterine cavity. See Chapter III., on Diagnosis.

**Inspection and Palpation** will show enlargement of the abdomen, unless the tumor is too small to produce that result. External palpation, if the tumor is large, discloses in the pelvis and lower abdomen a solid, usually hard, though sometimes soft mass. Exceptionally the growth has a peculiar elasticity which resembles fluctuation. The percussion-wave peculiar to ovarian cysts, however, is absent. The tumor may be single and symmetrical, globular or oblong. The presence of multiple myomata may, with their numerous projections, give to the uterus a most irregular form. Many small tumors may be distributed so evenly throughout the uterine walls as to cause a nearly symmetrical enlargement of the uterus. In such a case, however, the surface usually gives to the touch a sensation of small nodular irregularities. Inspection, palpation, and percussion will be further considered in connection with the differential diagnosis.

**Conjoined Examination.** The index or the index and middle finger in the vagina, the palmar surface directed toward the uterus and tumor, and the palpating finger of the right hand over the abdomen will, if the abdominal muscles are not too tense, enable the operator to outline the uterus and its myomatous projections. In the majority of cases ordinary conjoined examination will complete the diagnosis. The palpation is often much facilitated by means of the thumb in the vagina and the index-finger in the rectum. This enables the operator to pick up, so to speak, the enlarged uterus between the thumb and finger. Information through the examining finger is obtained not so much by forcing it up against the tumor as by strong pressure of the tumor against it by means of the right hand over the abdomen. If the abdominal walls are rigid or thick, anæsthesia may be necessary.

Intra-uterine Exploration is made by the finger, the sound, or the curette. Digital exploration of the interior of the uterus is possible only when the uterine canal is dilated. The dilatation may be brought about by expulsive uterine contractions upon an intra-uterine tumor, forcing it out, or by instrumental means. See page 97. The index-finger in the dilated uterus will recognize by direct touch the presence and character of an intra-uterine myoma, and may materially aid in its removal.

**The Sound and Curette.** *The one physical sign constant for all uterine myomata is elongation of the uterine cavity.* The increased length is proportionate to the size of the tumor, and may reach seven or more inches. The sound is often necessary to measure this length. A submucous tumor may, unless great care is used, obstruct the passage of the sound and lead to a wrong measurement. Submucous and intramural tumors project into the uterine cavity, and thereby render the uterine canal tortuous. Hence the sound or probe will be deflected, and as it glides over the growth the deflection will indicate the size of the growth, the degree to which it projects into the uterine cavity, and the depth of the uterus with which it is connected. The curette is useful for certain purposes of differential diagnosis and will be further considered under that head.

#### Differential Diagnosis.

The principal lesions from which myoma must be differentiated are the following :

Pregnancy.	Ovary.
Carcinoma and sarcoma.	Pelvic exudates.
Metritis.	Pelvic cysts.
Inversion of the uterus.	Sactosalpinx.
Uterine displacements.	Ectopic pregnancy.
Incomplete abortion.	Floating kidney.

**Pregnancy.** Normal utero-gestation will be excluded by the absence of the usual signs of pregnancy. The difficulties in diagnosis will commonly arise in abnormal pregnancies, especially in placenta prævia and in pseudo-menstruation connected with pregnancy. If the enlargement of the uterus be symmetrical and the rate of growth usual for a pregnant uterus, and the os be soft and patulous, pregnancy is highly probable. If, on the other hand, the cervix be hard, the os non-patulous, and the uterus irregular in outline from the presence of a hard, resisting mass, the diagnosis is probably myoma. In doubtful cases the myoma, if present, will under observation declare itself by its relatively slower growth. The possible coexistence of pregnancy and myoma should be kept in mind.

**Carcinoma and Sarcoma.** The evidences of a malignant disease, including the sudden onset of hydrorrhœa, the bloody, fetid discharge, the rapid emaciation, and the microscopic finding of carcinoma or sarcoma in the scrapings will definitely exclude myoma. A sloughing, extruding myoma may, however, both in the profuse fetid discharge and in the sensation to the examiner on touch, closely resemble



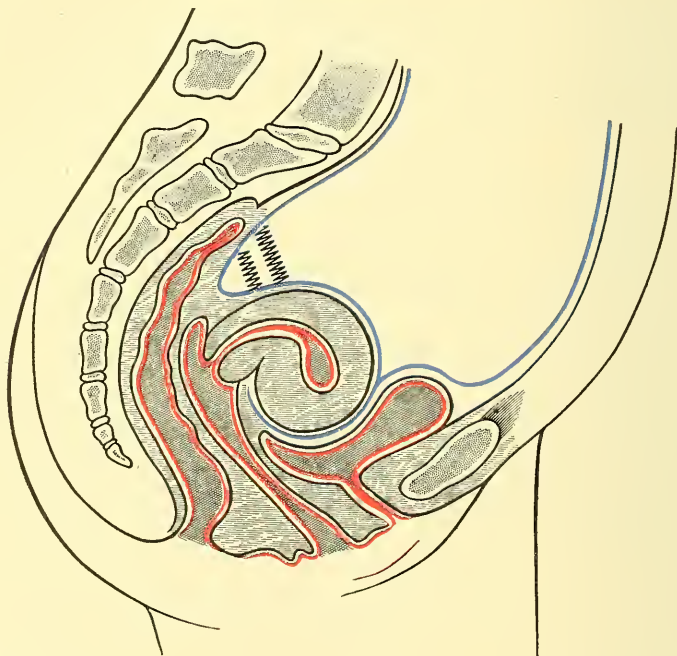
carcinoma or sarcoma of the cervix. The diagnosis then will depend on the microscope.

Metritis often complicates uterine myomata, and is difficult, often impossible, to differentiate from small, multiple, interstitial growths. The symmetrical form of the uterus is the distinguishing feature of metritis. See Figure 167.

**Inversion of the Uterus.** A uterine myoma protruding into the vagina may have the appearance of an inverted uterus. The sound will then glide past the tumor into the uterus above. Conjoined recto-abdominal examination will demonstrate the absence of the uterus in its normal location if it be inverted into the vagina. See *Inversion of the Uterus*. See Figure 164.

Displacements of the Uterus are recognized, on conjoined examination, by the symmetrical contour of the uterus and by the change in the direction of the uterine canal as demonstrated by the sound.

FIGURE 165.



Anteflexion of the uterus simulating myoma.

Incomplete Abortion with hemorrhage will be recognized by the history of the interrupted pregnancy and by microscopic examination of the scrapings.

The Ovary, especially if adherent to the uterus, sometimes simulates a small pedunculated subserous myoma. The myoma, however, is smoother, more firm, and less sensitive to pressure.

Pelvic Exudates, unlike myomata, always give a history of pelvic

inflammation, are very tender on pressure, immobile, and prone to disappear by resolution or to undergo suppuration.

**Pelvic Cysts** are distinguished from myomata by fluctuation, by their independence of the uterus, by their more rapid growth, by the normal or nearly normal length of the uterine cavity, and by the absence of uterine hemorrhage.

**Sactosalpinx** develops more rapidly, is commonly situated at the side of the uterus, is of elongated ovoid form, is fluctuating, more or less tender on pressure, and does not cause material enlargement of the uterine cavity.

**Ectopic Pregnancy** gives a history of gestation. The gestation sac closely resembles sactosalpinx. Rupture of the tube produces pelvic hæmatocele. A decidua showing chorionic villi may be cast out of the uterus.

**Floating Kidney**, unless adherent, is readily replaced, has the form of a kidney, and is often tender on pressure.

FIGURE 166.



Myoma simulating anteversion of the uterus.

### Prognosis.

Myoma may be present throughout the period of sexual activity and produce no subjective symptoms, or it may give rise to the symptoms already outlined. It may participate in the senile atrophy of the reproductive organs at the menopause or in involution after pregnancy,

and thus become much smaller or disappear. On the other hand, it may at either of these times grow larger. It usually develops rapidly during gestation. Even small growths, if near the endometrium, may threaten life from hemorrhage. Complicating cardiac and renal diseases render the prognosis more grave. The causes of death include hemorrhage, sepsis, peritonitis, and secondary changes in the tumor itself. The prognosis after operation is outlined in the next chapter.

## CHAPTER XXVII.

### TUMORS OF THE UTERUS.

#### TREATMENT OF MYOMA.

THE treatment includes medication, manipulations, intra-uterine tamponade, intra-uterine styptics, electrolysis, and surgical operations. The treatment is, therefore, non-surgical and surgical.

#### Non-surgical Treatment.

1. Medication.
2. Manipulations.
3. Intra-uterine tamponade.
4. Intra-uterine styptics.
5. Electrolysis.

1. Medication. Ergot stands at the head of the numerous drugs which have been used in the treatment of uterine myoma. Indeed, no other drug, save possibly *hydrastis canadensis*, has any special value. The latter is said to have some influence in the control of hemorrhage. The effect of ergot is to reinforce the natural modes of cure. Its possible action is:

*a.* Ergot may stimulate the uterine muscularis to contract on a myoma or its pedicle so as to cut off nutrition and produce atrophy or gangrene of the tumor. The gangrenous tumor, unless expelled or removed, is a source of great danger.

*b.* If the myoma is submucous or intramural and near the endometrium, the action of the drug may so increase the expulsive power of the myometrium as to expel the tumor or force it to a lower level, and thereby simplify its surgical removal.

*c.* If the myoma is subperitoneal or intramural and near the peritoneum, the increased uterine contractions may force it further outward and result in the formation of a pedicle. This would relieve the myometrium of its irritating presence, would stop the bleeding, and diminish the pain.

*d.* Ergot may diminish the blood-supply to the uterus, and thereby



control hemorrhage in two ways: first, by contraction of the uterine muscularis; second, by contraction of the bloodvessels.

The value of ergot as a means of radical cure is quite limited; its power to expel the tumor is chiefly confined to the simple subperitoneal pedunculated myomata, which yield more rapidly and more readily to surgical measures. Gangrene of an intramural tumor is a possible result of the drug, and is, for obvious reasons, more dangerous than the surgical removal of a healthy tumor. Ergot is chiefly valuable to control hemorrhage, and thereby to preserve the vitality of the patient until relief may come with the menopause or with the surgical removal of the tumor. This indication is strongest during the menstrual week.

The drug, if long continued, is not well borne by the stomach; hence it should be given either by hypodermic injection or by rectal suppositories. The dose is determined by the effect. If used at all, enough should be given to control the bleeding. The ice-bag over the hypogastrum is a valuable aid to ergot.

2. Manipulations. Sometimes a myoma becomes incarcerated in the small pelvis. Two results may follow: first, serious pressure symptoms; second, œdema of the tumor. The immediate indication is to force the tumor up into the abdomen. This is done by the finger or fingers of the left hand in the vagina or rectum. The knee-breast position is most favorable to this treatment. Anæsthesia may be necessary. In some cases the tumor is prone to fall into the pelvis minor and to cause great mechanical disturbances so that daily replacement is necessary. If the tumor is not replaceable its removal may be imperative.

3. Intra-uterine Tamponade. When the hemorrhage is profuse and exhausting, the most effective means of temporary hæmostasis is by intra-uterine tamponade. Its application is best made through Sims' speculum with the patient in the left latero-prone position. See page 82. In aggravated cases it is necessary to repeat the tampon several times at each menstruation. A continuous strip of aseptic gauze should be tightly packed into the uterus, especially into the cervical cavity. The packing should be removed every forty-eight hours until the flow has ceased. In this way an exhausted exsanguinated patient may in a few weeks regain strength to endure the radical operation. This treatment in the hands of the author has in one case been followed not only by entire relief of menorrhagia, but in the almost total disappearance of the tumor. The tampon was used during three consecutive menstruations, and the tumor was reduced from the size of a child's head to the size of a hen's egg. The age of the patient, forty-five years, and the near approach of the menopause may partially, at least, account for the result.

4. Intra-uterine Styptics, such as Churchill's tincture of iodine, solution of persulphate of iron, and the 10 per cent. solution of antipyrine, may be injected into the uterus for the control of hemorrhage. These agents, especially the persulphate of iron, are apt to form hard blood-clots, which may become septic and, therefore, dangerous. The method is altogether inferior to that of tamponade.

5. Electrolysis. The personal experience and observation of the

writer, extending over several years, have led him to the following conclusions: First, currents strong enough to be effective are often excessively painful and therefore intolerable; second, the agent in a limited number of selected cases of intramural tumors is capable of giving more or less relief from the symptoms of hemorrhage and pain; third, appreciable and permanent reduction in the size of the tumor is an unusual result; fourth, disappearance of the tumor as a result of electrolysis seldom occurs. In one case the writer observed the disappearance of an intramural leiomyoma after about twenty electrolytic treatments, the current varying from one hundred to two hundred and forty-two milliampères. The cure in this case may, however, have been due to the menopause, which was coincident with the treatment. The observations of Vineberg<sup>1</sup> upon the statistics of Keith, Engelmann, Gautier, and other eminent electro-therapeutists, show three hundred and seventy-two cases with nine cures and five deaths—an excessive mortality when contrasted with the limited number of cures. Galvanopuncture and electrolysis in fibrocysts are strongly condemned. The earlier promises of the enthusiastic supporters of electrolysis have not been fulfilled. Its immediate dangers also are considerable. The survival of the electrical method depends chiefly upon the patient's ignorance of its inadequacy and dangers, upon her worship of the mysterious, upon an unreasoning dread of operative measures, and upon a desire to grasp any other promising means of relief.

### Surgical Treatment.

It would be unprofitable to enlarge upon a great variety of procedures which have become or seem destined to become obsolete. The more useful operations for the treatment of fibromyomata of the uterus will be divided as follows:

1. Palliative operations.
2. Radical vaginal operations.
3. Radical abdominal operations.

#### 1. PALLIATIVE OPERATIONS.

The palliative operations are: *a.* Curettage. *b.* Ligature of the uterine arteries and broad ligaments. *c.* Removal of the uterine appendages.

*a.* Curettage. The irritating presence of the tumor often gives rise to hemorrhagic endometritis. Curettage is therefore indicated precisely as it would be in hemorrhagic endometritis from any other cause. The operation is generally followed by a degree of relief from the menorrhagia, is seldom permanent in its results, and must usually, therefore, be repeated again and again. It is especially useful in connection with intra-uterine gauze tamponade to control hemorrhage until an exhausted patient can gain blood and strength for a more radical operation, or, in cases of small tumors, until the menopause has passed. Curettage

<sup>1</sup> American Text-book of Gynecology, p. 41.

of the myomatous uterus gives increased danger of sepsis; hence the necessity for great antiseptic care. For a description of curettage, see Chapter IV.

*b. Ligature of the Uterine Arteries and Broad Ligaments.* The purpose of these measures is to shut off the blood-supply to the uterus, and, by this means, to induce atrophy of the growth. Gottschalk, of Berlin, reports cases of multiple myoma in which he ligatured the uterine arteries, with good results. Martin ligatures the whole base of the broad ligament so as to include not only the uterine artery, but its branches and certain uterine nerves. He even goes so far in desperate cases as to ligature also the ovarian artery on one side. Robinson reports successful cases in which he has ligatured the Fallopian tubes and broad ligaments, including the ovarian and uterine arteries on both sides. The method has hitherto failed to elicit much discussion. Even its authors of late preserve on this subject an ominous silence.

*c. Removal of the Uterine Appendages.* This procedure, which suggests the names of Batty, Hegar, and Tait, when properly carried out—*i. e.*, when the ligatures are placed close to the uterus so as to include a large part of the broad ligament—usually stops the hemorrhage and reduces the tumor, sometimes even causes it to disappear. Its dangers, however, are nearly if not quite as great as those of the more radical operations. This is especially true since the technique of the latter has now been perfected. Removal of the ovaries and Fallopian tubes for myomata has become an obsolete operation; at least, it will be done only in rare cases of small tumors in which, for some special reason, hysterectomy and myomectomy are inadvisable.

## 2. RADICAL VAGINAL OPERATIONS.

The vaginal operation is preferable when the tumor can be readily reached by that route. All cervical fibroids, all intra-uterine pedunculated fibroids, and some of the more accessible submucous fibroids have usually been removed by the vagina. In their removal the *écraseur* and galvano-cautery, so often used for hæmostasis, are unnecessary, because the hemorrhage is either not feared or can be readily controlled by the uterine tampon. This route has usually been reserved for the smaller tumors of a size not larger than the capacity of the small pelvis.

The radical vaginal operations are: *a.* Removal of small, pedunculated, intra-uterine myomata. *b.* Vaginal hysterectomy. *c.* Vaginal enucleation and morcellation.

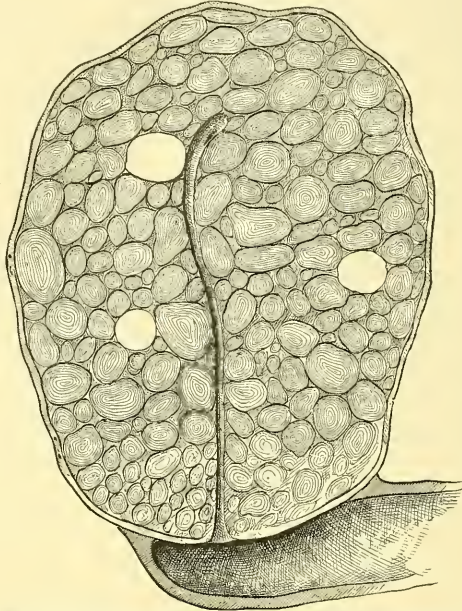
*a. Removal of Small, Pedunculated Myomata.* When the uterus is dilated, either by uterine contraction on the tumor or by instrumental means, the pedunculated tumor is seized by the vulsellum forceps or bullet forceps, drawn down, and removed by the scissors. The uterus is then packed with aseptic gauze.

*b. Vaginal Hysterectomy.* When numerous small tumors are scattered throughout the uterus, and the number is so large that individual enucleation is impossible, and the uterus is not too large to be



delivered through the vagina, it may be removed entire by vaginal hysterectomy. The operation is the same as vaginal hysterectomy for carcinoma. See Chapter XXIX. Delivery through the vagina sometimes presents unexpected difficulties. The surgeon should therefore be prepared for a supplemental abdominal section.

FIGURE 167.

Multiple myoma case suitable for vaginal hysterectomy.<sup>1</sup>

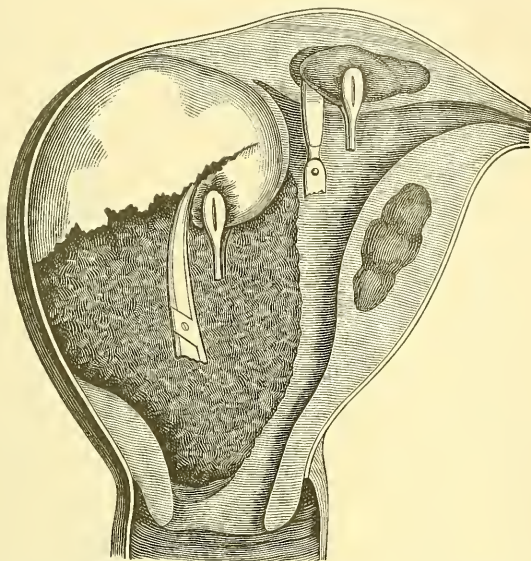
*c. Vaginal Enucleation and Morcellation.* Intramural myomata, especially if situated in the lower segments of the corpus or in the cervix uteri, and not too large, may be safely enucleated and removed through the vagina. Latterly the vaginal method has been often and successfully used by certain French surgeons for the removal of quite large tumors. Their removal is accomplished by repeatedly seizing the presenting part of the tumor with the vulsellum forceps and cutting away as large a piece as possible with the scissors, one piece after another, until the whole tumor has been removed. This is the operation by traction and morcellation or morcellation. The method, although generally supposed to be of more recent origin, was virtually described by Dr. Thomas Addis Emmet more than thirty years ago, and has been constantly advocated and practised by him ever since. It is applicable to those cases in which the tumor is accessible through the vagina, but too large to be enucleated and delivered entire.

The operation of traction and morcellation, when its technique is more generally understood and its advantages more appreciated, will undoubtedly become more and more a procedure of election in place of

<sup>1</sup> After Emmet. Principles and Practice of Gynecology.

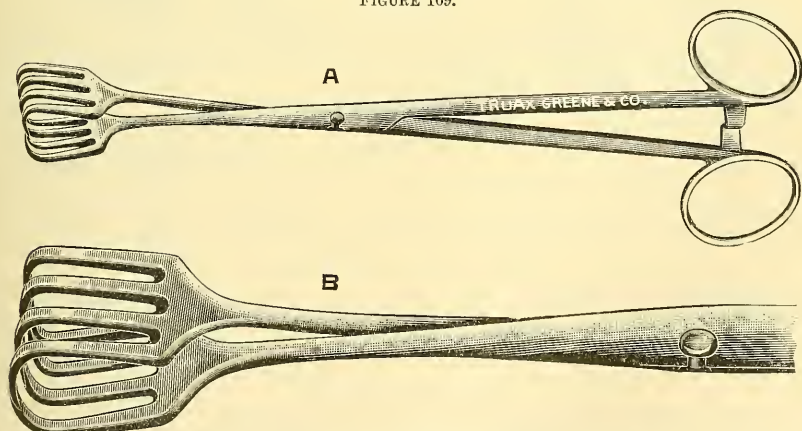
hysterectomy. Many large submucous or mural tumors, for which the abdomen is now opened and the uterus sacrificed, may be rapidly, safely, and effectually removed by this method.

FIGURE 168.

Morcellation of an intra-uterine myoma. Scalpel not recommended.<sup>1</sup>

One strong contraindication to the vaginal route must always be, however, the possible presence of pus tubes or ovarian abscesses, so often unrecognized or unrecognizable when they occur in connection

FIGURE 169.



Vulsellum forceps for grasping tumor in the operations of vaginal or abdominal myomectomy.  
A. Reduced size. B. Section of full size.

<sup>1</sup> From Péan. *Tumeurs de l'Abdomen et du Bassin.*

with large, irregular fibromyomata. Many a fatal result has followed the rupture of an unsuspected small pus tube caused by most careful enucleation or morcellation through the vagina. The vaginal route, then, should be avoided if there be any reason to suspect purulent disease of the uterine appendages.

FIGURE 170.

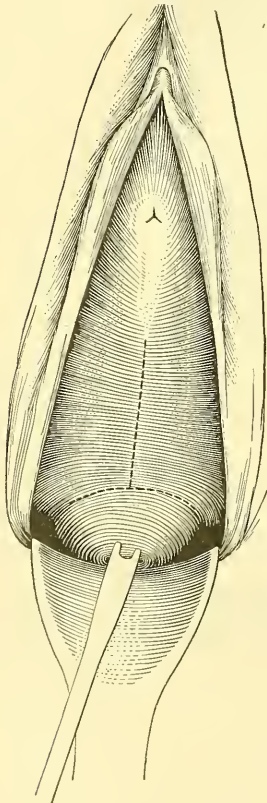


FIGURE 171.

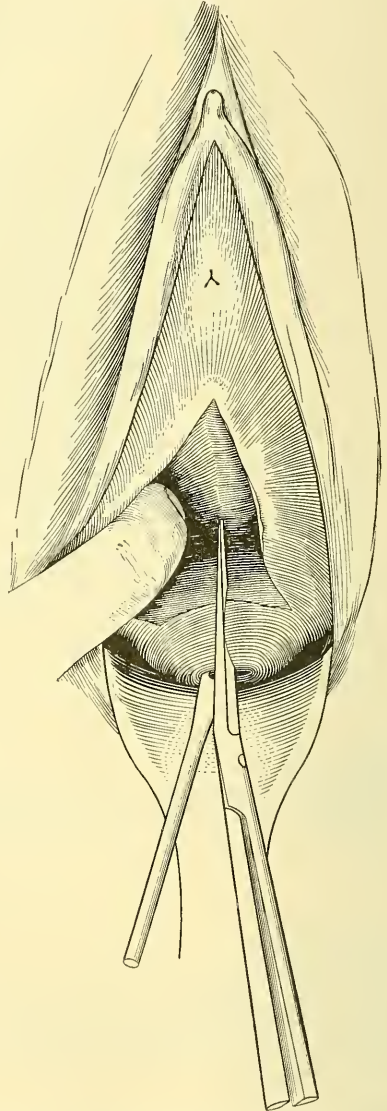


Figure 170.—Lines indicating the vaginal incisions to expose the anterior uterine wall, preparatory to dividing it with scissors.

Figure 171.—Making longitudinal division of anterior wall of uterus, in order to expose the field of operation for the removal of a myoma.



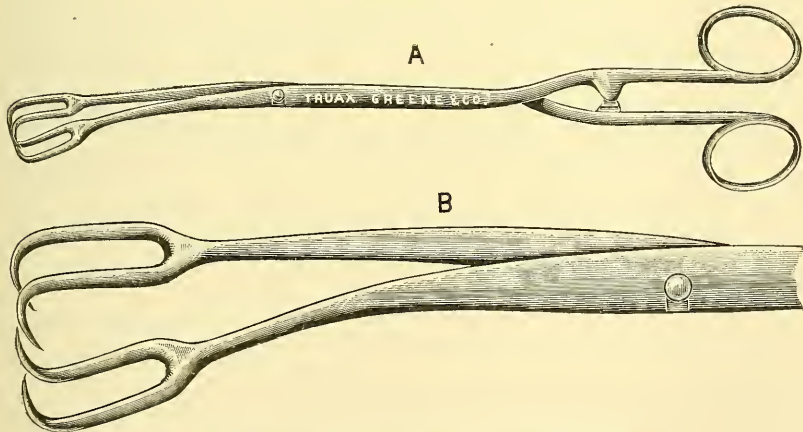
The tumor is usually made more accessible and its enucleation or morcellation is facilitated either by dilatation or, more frequently, by deep lateral incisions of the cervix, even to the internal os. These incisions having been made, the anterior and posterior lips of the cervix are drawn well down to the vulva and held widely apart by means of strong, double-tooth forceps in the hand of an assistant. The operator then seizes the presenting part of the tumor with heavy Péan morcellation tooth-forceps, and removes it, either by enucleation or by morcellation. If the tumor be of mural origin, it may be necessary to divide the mucous membrane and subjacent muscular tissue before commencing the enucleation. This incision should be parallel to the uterine canal.

The writer has suggested an improvement upon the two lateral incisions. It is a simple median incision through the anterior wall of the uterus, as follows:<sup>1</sup>

1. Make a circular incision in front of the uterus which shall separate the vaginal wall from the cervix at the utero-vaginal attachment, as shown in Figure 170.

2. Incise the anterior vaginal wall from the middle point of the first incision for a distance of about one inch, taking care not to invade the bladder and to avoid the ureters on either side. These incisions are the same as for anterior vaginal section, described in Chapter XXIII.

FIGURE 172.



Vulsellum forceps. A. Reduced size. B. Section of full size.

3. Separate the bladder from the uterus by means of the finger or some blunt instrument, keeping close to the uterus until the peritoneum is reached, but not divided. Then expose with retractors the anterior wall of the uterus. Figure 171.

4. Divide the anterior wall of the uterus longitudinally in the median line by means of scissors to whatever extent may be necessary to render

<sup>1</sup> Transactions Minnesota State Medical Society, 1896, published in the Journal of the American Medical Association, August 15, 1896.

the tumor accessible. Figure 171. If necessary, the peritoneum may be opened and the incision carried high up into the corpus uteri.

This simple anterior incision permits wide separation of the lateral fragments of the anterior uterine wall, and thereby exposes the endometrium, and may render accessible a myoma in any part of the uterine wall. It has the following advantages over the lateral incisions: 1. Less traumatism, one incision instead of two. 2. The parametria are not opened and exposed to possible sepsis. 3. The tumor would be more accessible, because the anterior uterine wall is out of the way, instead of being between the operator and his field of operation. 4. A much longer incision may be made, if necessary, because the broad ligaments are not involved. 5. Less hemorrhage. 6. The pelvic cavity may be easily reached through this incision for any accessory operation on the uterine appendages or peritoneum. Even a small pedunculated subperitoneal tumor could be removed.

### 3. RADICAL ABDOMINAL OPERATIONS.

These operations are adapted to large subperitoneal and intramural tumors which cannot well be removed through the vagina. The following is a general division of the subject:

*a.* Operations with extraperitoneal hæmostasis. *b.* Operations with intraperitoneal hæmostasis.

*a.* Operations with **Extraperitoneal Hæmostasis.** This subject recalls the old contest between the clamp and the intraperitoneal ligature in the treatment of the pedicle in ovariectomy—a contest which resulted in a complete victory for the ligature, and necessarily established the general principle that the extraperitoneal method is relatively dangerous, and, consequently, whenever perfect hæmostasis by the intraperitoneal method is practicable, should be avoided. Undoubtedly this general principle should apply with some force to the removal of other abdominal tumors. Nevertheless, the earlier statistics in myomectomy and hysterectomy show that the dangers which necessarily belong to the clamp were more than balanced by the insufficiency of any means, then known, of intraperitoneal hæmostasis.

The advocates of the clamp based their objections to the ligature upon the observation that the moist, soft, uterine stump when ligatured and returned to the abdomen would at once become a source of danger from hemorrhage and decomposition, with consequent sepsis and peritonitis. However tightly the ligature was drawn around the uterine stump, however carefully the flaps of the stump were stitched together, however perfect the hæmostasis may have appeared upon the completion of the operation, the fact remained that shrinkage of the stump within a few hours, with consequent loosening of the ligatures, almost invariably occurred from the escape of serum, and fatal hemorrhage or sepsis too often followed. The extraperitoneal treatment, therefore, was for a time almost universal, and with improved technique gave promise of becoming the established method. In the hands of Keith and a few other extraordinary surgeons it gave a singular freedom from mortality; but in the hands of the average operator the mortality was unfortunately

too great. This was so because of the extreme difficulty in keeping the stump aseptic. It would suppurate in many cases and was then the medium of peritoneal infection.

In myomectomy the history of ovariectomy has repeated itself—first, the intraperitoneal treatment of the stump; second, the extraperitoneal treatment, rendered necessary on account of the difficulty of intraperitoneal hæmostasis. Now, finally, the intraperitoneal treatment has become the established method in myomectomy and hysterectomy.

The essential condition formerly wanting was supplied by simple ligation of the uterine and ovarian vessels, thereby shutting off the blood-supply from the field of operation. This not only renders the operation bloodless, but prevents secondary hemorrhage. It now seems extraordinary that the very first operator who ever attempted myomectomy did not realize the surgical necessity of first shutting off the blood-current by ligaturing these vessels. Instead of using this simple, direct, natural procedure, we have been for a quarter of a century groping about in the dark, searching in out-of-the-way places for a method by which we could secure intraperitoneal hæmostasis. Just as soon as Baer, Eastman, and others began to ligature these vessels the whole procedure became simple. It is the old story of Columbus and the egg over again.

It would be unprofitable to continue the discussion of the clamp against the intraperitoneal ligation in the surgical treatment of uterine myoma. The subject is rapidly passing out of the field of discussion and becoming a matter of ancient history. The few remaining advocates of extraperitoneal hæmostasis claim that in at least a limited class of cases the uterine stump, if not too large, may be brought into the abdominal wound and fixed there by means of the clamp or *serre-nœud*, and that the operation may thereby be completed in a much shorter time than would be required by the intraperitoneal method. Furthermore, it is claimed that if the condition of the patient is precarious the extraperitoneal clamp, or *serre-nœud*, or elastic ligation may be useful, because they enable the surgeon to complete the removal of the tumor with the minimum of operating, and so fulfil a useful indication—the saving of time. The author, however, during the past five years has not had occasion to use this method.

*b. Operations with Intraperitoneal Hæmostasis.* In this class of operation the relations of the tumor to the uterus and the surrounding conditions may determine its removal in one of three ways: 1. Certain myomata may be removed without sacrificing any part of the uterus. 2. All of the uterus, except the infravaginal portion of the cervix, may have to be removed with the tumor. 3. The entire uterus may have to be removed. The operations, therefore, are:

1. Myomectomy—without sacrifice of the uterus.
2. Supravaginal hysterectomy.
3. Complete hysterectomy.

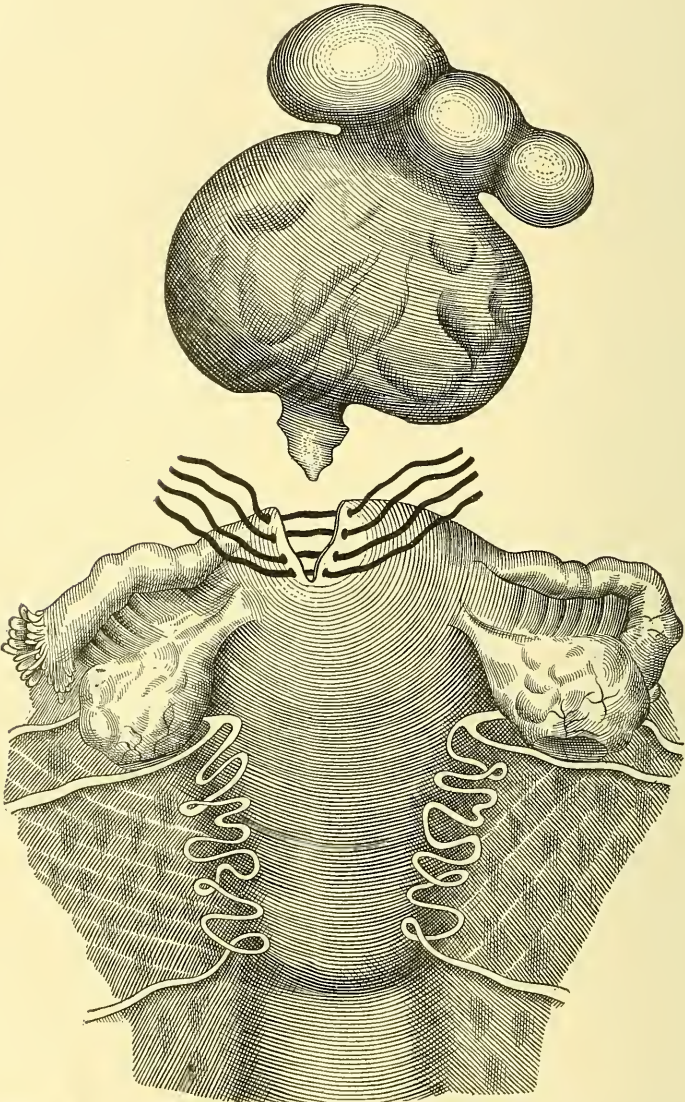
1. *Myomectomy.* Subperitoneal tumors, if pedunculated, or if not too broadly attached to the uterus, may often be removed with slight traumatism. The uterine wound is then readily closed with



interrupted catgut sutures, and the abdominal wound is closed without drain. Such an operation is very simple and safe. See Figure 173.

Intramural tumors, even though quite large, may often, with the

FIGURE 173.



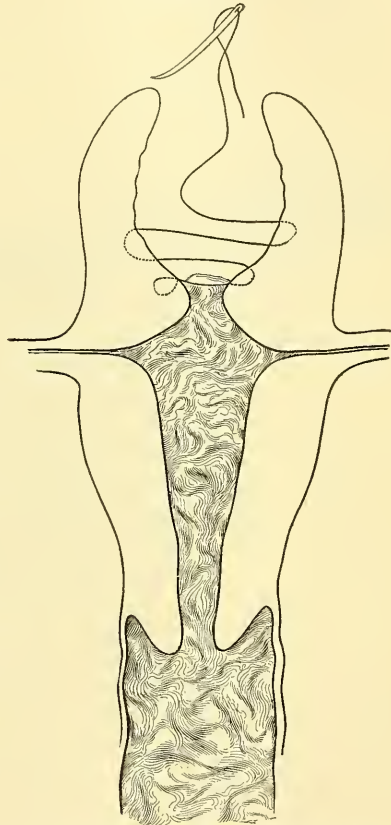
Excision of pedunculated subperitoneal myoma. Sutures in place ready for closing the uterine wound. Excised tumor shown detached.

greatest ease, be shelled out of their beds and the uterine wounds successfully closed. The tumor-cavity, if not too large, is obliterated by closure with numerous interrupted or continuous buried catgut sutures,

and finally the peritoneal margins of the uterine wound are united by a close row of rather deep Lembert sutures. During the enucleation of the tumor and the closure of the uterine wound, hemorrhage is controlled by a temporary elastic ligature around the cervix uteri. Before closing the abdominal wound this ligature is removed, and a little time is allowed to make sure that there is to be no hemorrhage from the uterine wound. Hemorrhage is usually in great measure controlled by the uterine contraction which follows the enucleation. The mortality of this method for small tumors, in which the traumatism is slight, is surprisingly small.

In case of a large tumor, and consequently of large traumatism with enormous surfaces to be united by buried sutures, the method involves too great danger of sepsis, and should be modified as follows: After the tumor has been shelled out from the uterine wall an opening is made directly from the tumor cavity to the uterine cavity. If the uterine canal is patulous, a continuous strip of gauze is carried from the tumor cavity directly through into the vagina, and the tumor cavity is packed with the same continuous strip. The temporary elastic ligature around the cervix does not interfere with the introduction of the gauze. The uterine wound is then closed, as above described, by buried sutures and deep Lembert sutures of catgut. The peritoneal margins of this wound, thus turned in and united, rapidly grow together, and the whole uterine traumatism, now isolated from the peritoneum, is adequately drained through the vagina. If the uterine canal is not sufficiently patulous, it may be dilated or bilaterally incised by means of a herniotomy knife, or it may be both dilated and incised. The vagina is loosely filled with gauze to meet that which protrudes from the uterus; an absorbent vulvar dressing, to be changed as often as it becomes moist, completes the capillary drain. The gauze is removed in two or three days. Care is necessary in the closure of the uterine wound that the gauze be not caught in a suture, because then its removal would have to be postponed until after the absorption of the suture.

FIGURE 174.

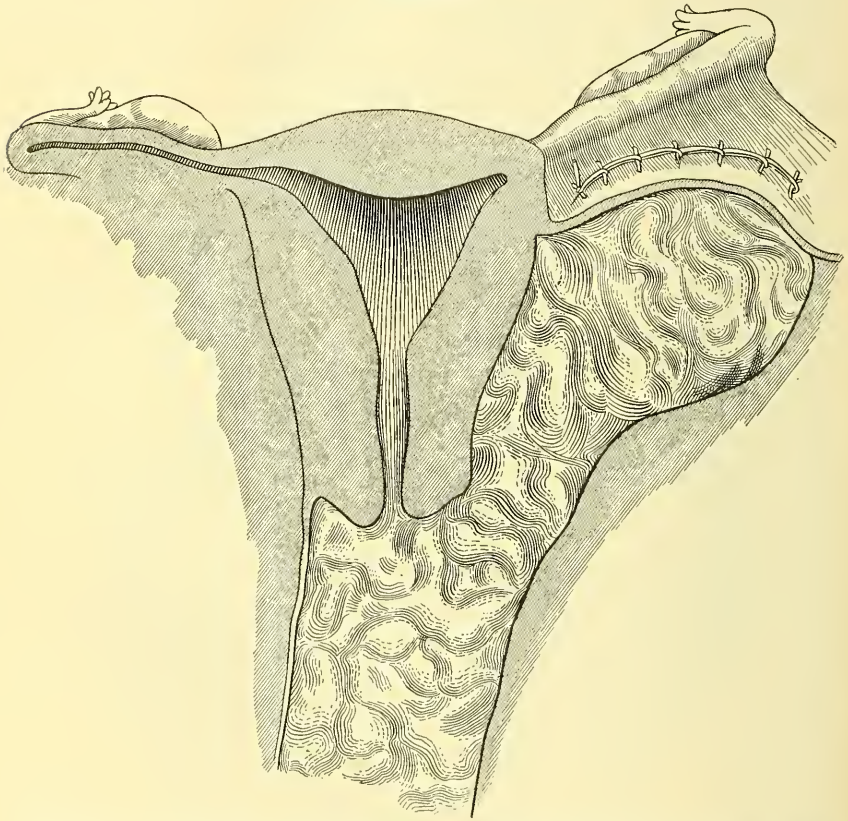


An intramural myoma has been enucleated; tumor cavity in communication with uterine cavity being obliterated by continuous buried catgut suture; utero-vaginal gauze drain in place.



An intraligamentous myoma may be readily shelled out from its bed between the folds of the broad ligament. The same principles of drainage apply as in the case of intramural tumors, except the route of drainage. This should be not through the uterine canal, but through an opening which is readily made from the tumor cavity to a point in the vagina just back of or in front of the uterus. In exceptional cases it may be necessary for purposes of hæmostasis to ligature the ovarian or uterine artery, or both. Experience has shown that sloughing of the uterus from thus cutting off its blood-supply is not to be feared.

FIGURE 175.



Intraligamentous myoma has been removed from space between folds of broad ligament. Gauze drain from this space through an opening direct into vagina.

Intra-abdominal closure with vaginal drainage of the tumor-cavity was early suggested and practised by August Martin, of Berlin,<sup>1</sup> but this surgeon appears not to have developed or practised the method extensively.

The author's experience during several years with the above technique shows, first, almost entire freedom from mortality; second,

<sup>1</sup> Diseases of Women. Second American edition, pp. 289-291.



prompt and uneventful recovery; third, the most gratifying permanent results. The method is undoubtedly applicable to a much larger number of tumors than is generally supposed. Any surgeon who is constantly alert to enucleate the tumor and preserve the reproductive organs will be surprised at the number of cases in which this is entirely feasible. The mutilating operation of hysterectomy for myoma is often necessary, but not so often as the statistics of the present time would indicate. In the vast majority of cases the uterine appendages will be found normal, and in a large proportion of this majority the tumor may be enucleated from the uterus and the wound successfully closed, precisely as would be required for the removal of such a tumor in any other part of the body. Cases of very large tumors and cases in which many small tumors are scattered through the uterine wall may require hysterectomy, but the conservative operation of simple enucleation will often apply when the tumor is even larger than the foetal head, and in cases of multiple myomata even when there are several tumors. The preservation of the uterus when the appendages have to be removed, unless the organ is infected, is desirable. This question is more fully discussed on page 262.

Drainage of the tumor cavity by stitching it into the abdominal wound and packing it with gauze<sup>1</sup> has been successfully carried out in many cases. The vaginal route for drainage, however, offers decided advantages, and will therefore usually be preferred.<sup>2</sup>

2. *Supra-vaginal Hysterectomy.* The usual preliminary measures in abdominal operations, to disinfect the vagina and thereby to avoid possible peritoneal infection from that source, are imperative, because, first, infection may pass through the cervical canal to the peritoneum; second, vaginal drainage may require an opening to be made anterior or posterior to the cervix, or the operation may have to be extended to complete hysterectomy by the removal of the cervix. This would bring the vagina even more directly in relation to the peritoneum.

The abdominal incision, first made only long enough for exploration with the finger or hand, may, if the tumor is to be removed, be lengthened for that purpose. The bladder is often drawn far upward, and might be injured by the low incision; hence the incision should not be commenced too near the pubes. The remaining steps of the operation are these: 1. To bring the tumor through the abdominal wound. 2. To ligature the uterine and ovarian vessels. 3. To remove the tumor and the supravaginal portion of the uterus. 4. To make the toilet of the peritoneum. 5. To close the wound.

The delivery of the tumor is sometimes made by pressure on the abdominal walls around the incision, thereby squeezing it out as one would squeeze out pus after opening an abscess. Usually, however, it is delivered by traction with heavy vulsellum-forceps. The corkscrew often used is objectionable, because sometimes it becomes advisable to abandon the radical operation and only make an exploratory incision; then the deep wound of the screw would be a disadvantage. Some-

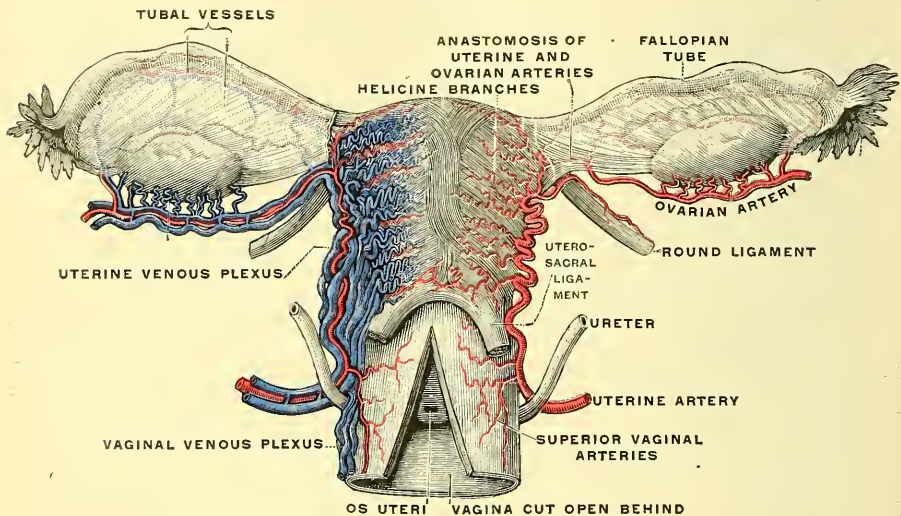
<sup>1</sup> Polk. E. C. Dudley. Senn.

<sup>2</sup> The author first used utero-vaginal drainage in myomectomy in April, 1889. Case reported in American Journal of Obstetrics in September, 1889.

times the delivery of the tumor is impossible until after some of the ligatures have been placed and the mass has been partially at least severed from the broad ligaments. If the incision is very long, its upper part may be closed at once. This serves to keep the intestines back and to limit their exposure.

The arteries to be ligated are shown in Figure 176. The ovarian vessels are first secured by passing a ligature around the outer extremity of the broad ligament close to the wall of the pelvis—*i. e.*, around the infundibulo-pelvic ligament. Reflex hemorrhage from the uterus is prevented by a ligature or forceps on the uterine end of the

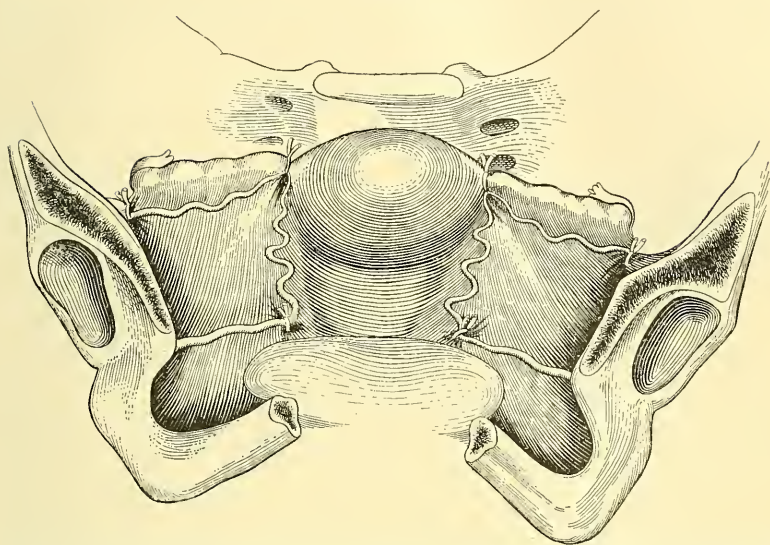
FIGURE 176.



Vascular supply of the uterus and its appendages.

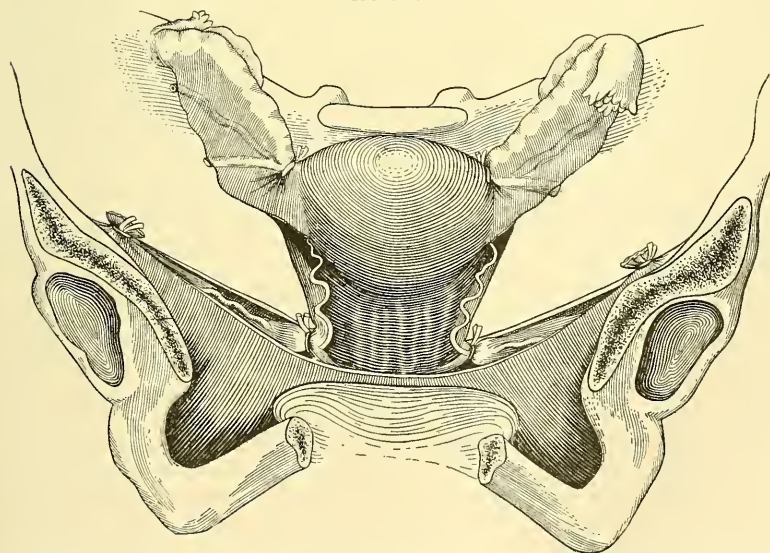
ligament. Each broad ligament is thus tied. The uterus and its appendages are then freed from the upper portion of the broad ligaments by severing with scissors the ligaments between these ligatures. See Figures 177 and 178. The uterine peritoneum is now to be girdled by lightly passing the scalpel, or pointed scissors, around the uterus an inch or more above the attachment of the bladder to the uterus. The circumuterine peritoneum and the bladder are now stripped down to the level of the uterine arteries. The relations of the bladder may often be more readily recognized by passing a sound into it, or partially distending it with sterilized water. The uterine arteries are located sometimes by sight; oftener by touch. Each one is then secured by a ligature isolated or *en masse*. This ligature, in order to avoid the ureters, should be close to the uterus. See Figures 178 and 179. In some cases the tumor so fills the pelvis that the ligatures cannot be applied. Then, a temporary elastic ligature having been thrown around the cervix, the tumor may be rapidly enucleated and the ligatures afterward applied.

In the removal of the tumor and the supravaginal portion of the

FIGURE 177.<sup>1</sup>

Broad ligament and infundibulo-pelvic ligament ligatured on each side. Ovarian vessels thereby secured. Ligature of the uterine vessels, as shown here, is usually deferred to a later stage of the operation.

FIGURE 178.



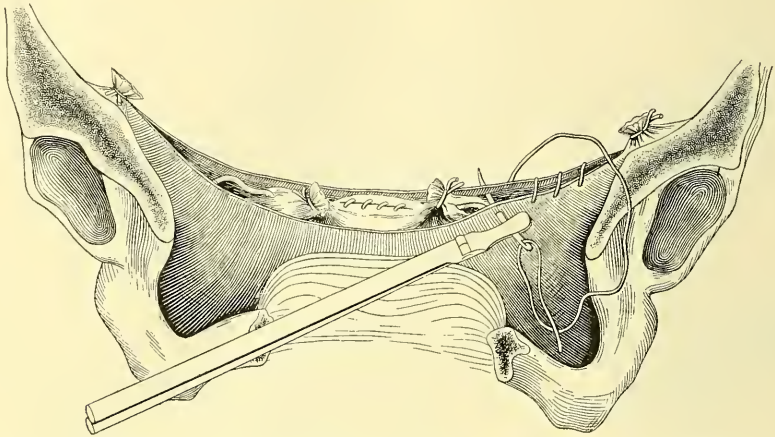
Upper portion of the broad ligaments divided, and upper portion of uterus and appendages thereby freed. Ligatures on uterine arteries en masse.

<sup>1</sup> Figures 177, 178, and 179 were suggested by similar illustrations of Baldy and Penrose, from which they are modifications.



uterus a wedge-shaped incision is made with scissors through the lower portion of the cervix ; this permits the easy inversion of the uterine flaps.

FIGURE 179.



Tumor and supravaginal portions of uterus cut away. Anterior and posterior edges of peritoneal wound being whipped together by a running catgut suture in order to cover uterine stump and the stumps made by ligatures of uterine arteries. In some cases stumps of the ovarian arteries can also be drawn down and covered.

The toilet of the peritoneum comprises the following steps: 1. Ligature of any bleeding-points; 2. Cauterization of the cervical canal with carbolic acid; 3. Closure of the cervical canal; 4. Covering of the stumps with peritoneum. Figure 179 shows the anterior and posterior cervical flaps thus united and the peritoneal flaps being whipped together by a continuous catgut suture. All intra-abdominal sutures and ligatures may be silk or catgut, preferably the latter. The drainage, if required, is best made through an opening posterior to the uterus into the vagina. The necessity for drainage, however, would usually render the removal of the entire cervix desirable. It is common in supravaginal hysterectomy to close without drainage. The abdominal wound is closed in the usual manner.

3. *Complete Abdominal Hysterectomy.* The removal of the entire myomatous uterus is indicated, first, when the uterus is septic or otherwise so diseased as to render the presence of any part of it unsafe; second, when extensive pelvic suppuration or traumatism require vaginal drainage.

The operation, except ligature of the ovarian vessels and division of the broad ligaments, differs from supravaginal hysterectomy in certain technical details: When the cervix is accessible through the vagina the first incisions may be made as for vaginal hysterectomy. The bladder and the rectum are stripped away from the cervix, in some cases as far as the pelvic cavity. The broad ligaments are separated through the vagina and tied off as high as practicable. The extent to which this can be done will vary greatly with the individual case. The vagina is now temporarily packed with a continuous strip

of gauze. The final removal of the uterus through the abdomen is greatly facilitated even by a small amount of vaginal detachment. The vaginal incisions, if impracticable in the beginning, may sometimes be readily made after the abdomen has been opened and the uterus has been freed from the broad ligaments above. The abdomen having been opened, the operation is continued as already described for supra-vaginal hysterectomy. The uterine arteries are usually tied a little further from the uterus. This necessitates the greatest care not to include the ureters, which cross them quite near the uterus. The uterus is then removed by means of strong scissors. It is important that the incisions for this purpose be always made close to the uterus. No harm is done if, on either side, a small portion of the lateral walls of the cervix uteri be left behind.

If the vaginal incisions have previously extended into the pelvic cavity the final removal of the uterus will be easy. If the incisions have not extended so far the removal will not be difficult, but if no vaginal incisions have been made the operator may find it quite tedious, if not difficult, to work his way down into the vagina. The attempt has occasionally resulted in opening the rectum, bladder, or ureter. This difficulty may be largely overcome by a simple device,<sup>1</sup> as follows :

The bladder having been stripped away from the cervix as far down as possible toward the vagina, the uterus is drawn by means of vulsellum-forceps well up through the abdominal wound. This traction exposes the anterior wall of the cervix, which is now freely divided with sharp scissors by a longitudinal incision and the cervical canal thereby laid open. See Figure 180. One blade of the scissors is now passed directly down through the external os to the vagina, and the entire anterior cervical wall is divided. The finger now readily passes to the vagina, and serves as a guide for the rapid removal of the organ by a circular incision around the cervix at its vaginal attachment. In some cases it is convenient to reserve the ligaturing of the uterine arteries to this part of the operation.

Any small bleeding vessels are now tied or twisted. If the broad ligament on either side is gaping, its peritoneal folds are brought together by a running suture. Any surfaces exposed by the traumatism of the operation are, if practicable, covered by drawing the peritoneum over them and stitching it there. The vaginal wound is closed on the abdominal side by interrupted or running catgut sutures. In this way the peritoneal margins of the wound are inverted as by the Lembert suture. The vaginal margin of the wound may at the same time be closed by the same or another suture.

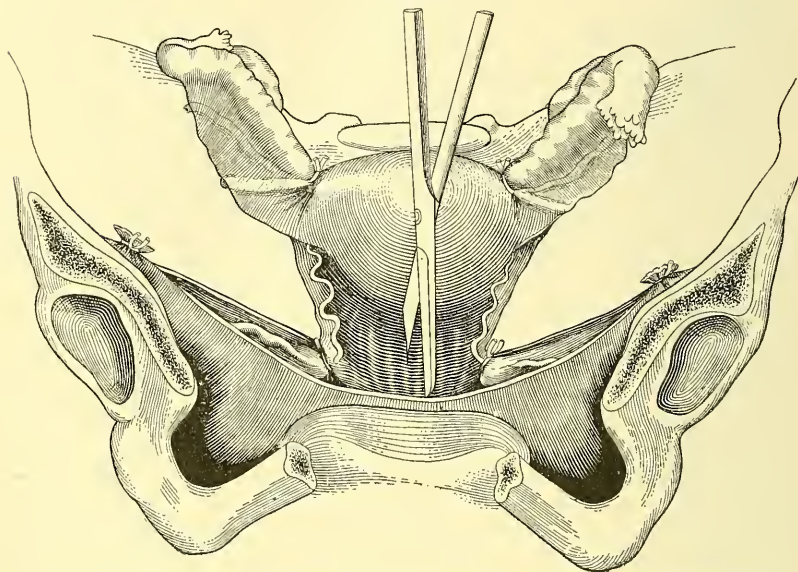
If the stumps of the broad ligaments and ligatured vessels can be drawn down into the vaginal wound, the sutures at the extremities of the wound, if properly reinforced and passed through them, will serve to hold them there. The ligaments when fixed to the vagina in this way serve to support the pelvic floor, and thereby to prevent rectocele, cystocele, and enterocele vaginalis. This disposition of the broad liga-

<sup>1</sup> This method of excising the cervix from the abdominal side of the pelvic floor has been used by the author for several years with great satisfaction.

ment stumps is most desirable, though not always possible. See Vaginal Hysterectomy.

Drainage, if required, is made by packing the field of operation and the vagina with a continuous strip of aseptic gauze. The vaginal wound is then left partly or wholly open. See Chapter VII. The abdominal wound is usually closed without drainage.

FIGURE 180.



Longitudinal incision of the anterior wall of the cervix to facilitate complete hysterectomy.

*The danger* of the removal of uterine myomata varies with the skill of the operator, the location and relations of the tumor, and the condition of the patient. The mortality of the abdominal operation in the hands of the average operator has been placed at about 15 per cent. This is too high. Under favorable conditions the expert surgeon should have at least 95 per cent. of recoveries. Statistics usually show a mortality of about 25 per cent. in the removal of intraligamentous tumors of broad uterine connections and of supravaginal tumors of the upper part of the cervix. This, again, is too high. The method already described for the removal of these tumors with gauze drainage toward the vagina, when required, closure of the tumor-cavity in the abdomen, and ligature of the uterine vessels, if necessary, has reduced the mortality to a very small minimum. Vaginal hysterectomy of the small myomatous uterus has a mortality of not more than 2 or 3 per cent. The removal of a tumor from the infravaginal portion of the cervix and the removal of intra-uterine polypi through the vagina are practically without danger. The long-continued menorrhagia so commonly associated with uterine myomata may so exhaust the woman as greatly to decrease her resistance, and thereby to increase the danger of an operation; hence the occasional necessity of prepara-



tory curettage, uterine tamponade, general treatment, and delay until the systemic condition is more favorable.

### Myomectomy during Pregnancy.

The following conditions more or less strongly contraindicate surgical treatment during pregnancy. 1. Small size and slow growth of the tumor. 2. Location of the tumor where it will not materially interfere with utero-gestation or obstruct delivery. 3. Probability that it will rise spontaneously, or may be manually forced out of the pelvis into the abdomen, where it will not interfere with pregnancy or parturition. The opposite of these conditions may call for surgical measures. The following radical measures may then be considered :

1. If the foetus is not viable, abortion, and, later, myomectomy or hysterectomy.

2. Cæsarean section or Porro's operation, or complete hysterectomy, if the child is viable.

3. Removal of the tumor without interrupting pregnancy or sacrificing the uterus.

If surgical interference is inevitable, and gestation has not advanced beyond the end of the third month, the indication is for abortion. Interruption of gestation at this time, and a radical operation for the removal of the tumor later, would be the safest course for the woman. After the third month the danger of abortion is enormously increased. This increased danger comes from the difficulty of delivering the placenta, from infection, and from hemorrhage. Cæsarean section, to be immediately followed by complete hysterectomy or supravaginal hysterectomy, may now, in the interest of the child, be deferred, if possible, to the period of viability—that is, to the end of the seventh month, or later. The removal of the tumor without sacrificing the uterus or interrupting gestation may be preferred when the tumor is subperitoneal and removable with small uterine traumatism. This operation is specially indicated in subperitoneal pedunculated tumors.

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## CHAPTER XXVIII.

### TUMORS OF THE UTERUS.

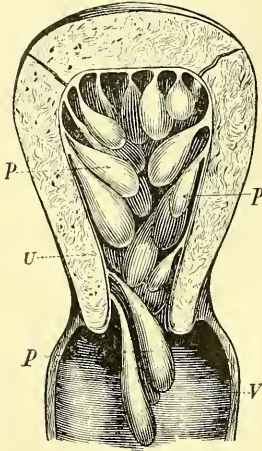
#### BENIGN ADENOMA.

##### Pathology.

BENIGN adenoma is a growth composed mostly of gland tissue, is usually associated with endometritis, and may be sessile or peduncular—rarely racemose; its gross appearance on the cervix is shown by Figures

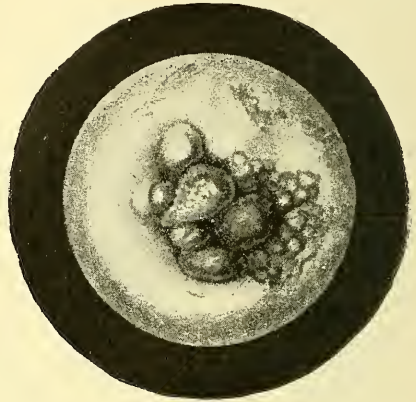
181, 182, and 183. The disease may be confined to the cervix or to the corpus uteri; when sessile and confined to the cervix it is usually around the os, but may extend upward into the uterine canal, and may

FIGURE 181.



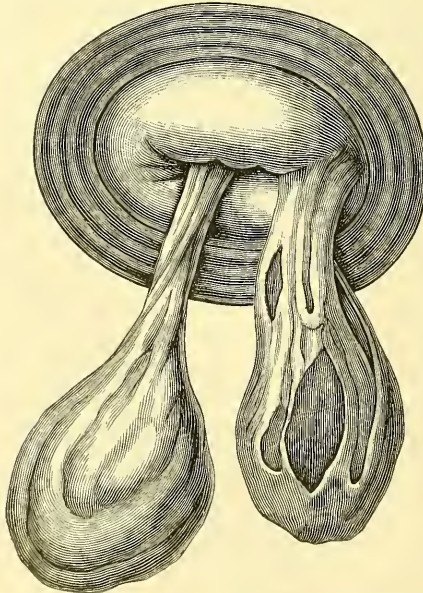
Polypoid adenoma of the uterus.<sup>1</sup>  
p, p, p. Polypoid growths. U. Uterus.  
V. Vagina.

FIGURE 182.



Sessile adenomata of the cervix at the external os uteri.<sup>2</sup>

FIGURE 183.



Adenoid polypus of the cervix uteri. So-called follicular hypertrophy.<sup>3</sup>

<sup>1</sup> From Thomas and Mundé; De Sinéty.

<sup>3</sup> Pozzi. Treatise on Gynecology.

<sup>2</sup> From Thomas and Mundé.

also penetrate the muscularis. It often presents a small, velvety areola of pink color, covered by tenacious mucus.

The pedunculated variety is single or multiple, is composed of racemose glands, connective tissue, and, usually, muscle fibres, and is covered by columnar epithelium, which generally becomes flattened to pavement epithelium when the growth protrudes into the vagina. This disease has been erroneously classed as polypoid endometritis. The so-called hyperplastic (not hypertrophic) glandular endometritis is also an adenoma. See Pathology of Endometritis.

The racemose variety is rare, has the appearance of a so-called hydatid mole, may spring from any part of the uterine mucosa, and may be local or general. In minute structures it is the same as polypoid adenoma.

### Symptomatology.

The symptoms, for the most part, are those of the associated endometritis—*i. e.*, menorrhagia, metrorrhagia, and increased secretion. The leucorrhœa is serous or muco-purulent. The great practical significance of benign adenoma is its tendency to become malignant; hence the necessity for early diagnosis, thorough curettage, and watchful expectancy.

### Diagnosis.

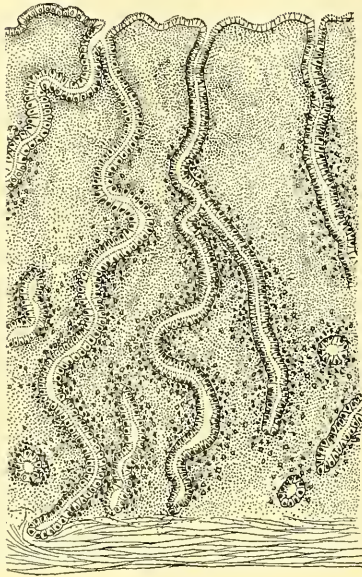
The diagnosis is by the microscope, and is, first, with hypertrophic glandular endometritis; second, with malignant adenoma—*i. e.*, with carcinoma. Sharp diagnostic lines cannot always be drawn between these three conditions. They may shade into one another by almost imperceptible gradation. Typical cases will show the following distinctions:

<i>Hypertrophic glandular endometritis—that is, parenchymatous endometritis.</i>	<i>Benign adenoma. So-called polypoid endometritis.</i>	<i>Malignant adenoma—that is, carcinoma.</i>
1. Glands increased in size but not in number.	1. Glands increased in size and number.	1. Glands very greatly increased in size and number.
2. Interglandular stroma not decreased.	2. Interglandular stroma decreased.	2. Interglandular stroma greatly decreased.
3. No proliferation of gland epithelium.	3. Proliferation of gland epithelium.	3. Very great proliferation of gland epithelium.
4. Gland structures nearly or quite typical in outline. See Figure 184.	4. Gland structures more tortuous in outline. See Figure 185.	4. Gland structures very atypical in outline. See Figure 186.
5. Hypertrophied epithelium confined within the limits of the tunica propria.	5. Proliferation confined within the limits of the tunica propria.	5. The proliferating gland epithelium has broken through the tunica propria and is in direct contact with interglandular connective tissue, and is multiplying in an atypical manner.

The growths very frequently return and require repeated curettage. This is evidence, though not proof, of malignancy.

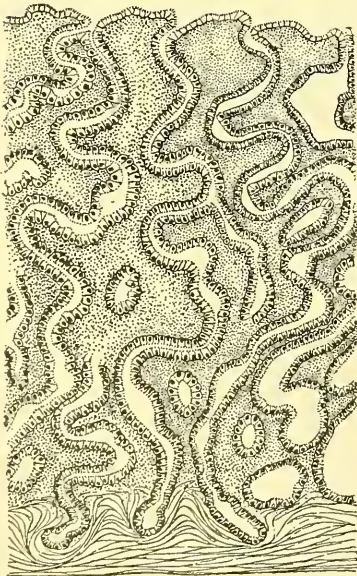


FIGURE 184.



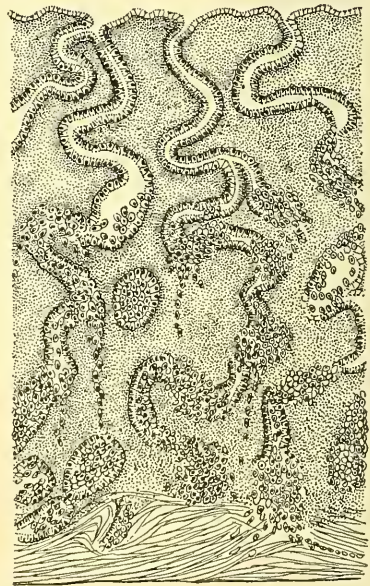
Hypertrophic glandular endometritis. Semi-diagrammatic. See also Figures 115 and 116 and the accompanying text.

FIGURE 185.



Benign adenoma. So-called polypoid endometritis. Semi-diagrammatic.

FIGURE 186.



Malignant adenoma—*i. e.*, cancer. The glandular elements have broken through into the interglandular spaces. Semi-diagrammatic.

## Treatment.

The treatment is timely curettage. The operation should be made with the sharp curette, and should be most thorough. The disposition of the disease to return after curettage is partly explained by the occasional failure to remove all the growth and to its tendency to become malignant.

## CHAPTER XXIX.

## TUMORS OF THE UTERUS.

## CARCINOMA.

## Pathology.

CARCINOMA may arise from any portion of the uterine mucosa—*i. e.*, from the cylindrical epithelium of the corporeal or cervical glands, from the surface cylindrical epithelium of the interior of the uterus, or from the pavement epithelium outside of the external os. The variety of the cancer corresponds to the type of epithelium from which it springs—*i. e.*, cylindrical carcinoma occurs on the corporeal and intracervical mucosa, and the pavement-cell variety occurs on the external vaginal surface of the cervix. This rule is not invariable. Eversion of the intracervical mucosa is quite common—see Laceration of the Cervix—hence the frequent formation of the cylindrical carcinoma outside of the apparent os externum. On the other hand, pavement epithelium may be present in the cervical canal, or even beyond the internal os in the uterine cavity, and there give rise to pavement-cell carcinoma.<sup>1</sup>

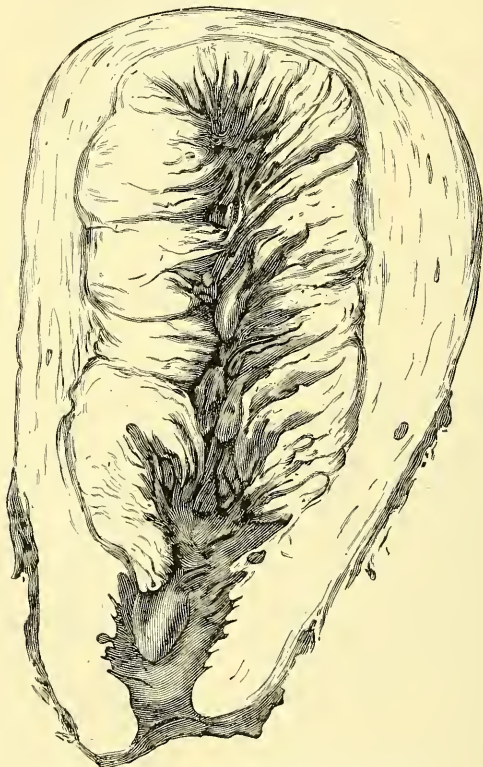
From the pathological stand-point there are thus two varieties of carcinoma. One type is that in which the squamous cells of the cervix have multiplied in an atypical manner and have invaded the deeper tissues; this is the so-called epithelioma, like that which occurs at the junction of the skin and mucosa of the lip. The other type is that in which the cylindrical cell gland acini of the interior of the cervix and corpus uteri multiply in an atypical manner, invade the interglandular stroma, and thus conform to the carcinomatous type. This is the variety mentioned in the previous chapter as malignant adenoma; the growth is there classed as primarily a benign adenoma which has undergone malignant degeneration; this transition stage, however, is not necessarily a part of the development of carcinoma, as the growth may be malignant from the beginning.

<sup>1</sup> Ries, American Gynecological and Obstetrical Journal, February, 1896; Zeitschrift für Geburtshilfe und Gynäkologie, vol. xxiv.

Carcinoma of the cervix usually originates near the os externum, where the cylindrical and pavement epithelium meet. The tendency of the growth early in the disease is either to extend to the submucous structures or to confine itself chiefly to superficial areas.

When it invades the deeper tissues the affected portion is enlarged, hard, marble-like, and friable. The surface is smooth, glistening, and flattened, or may be nodular. The growth rapidly extends and early ulcerates. The margin of the ulcer is irregular, hard, and usually raised. The base is irregular and bleeds easily. The ulcerative process may slowly or rapidly destroy the cervix. This form has been called infiltrating or nodular carcinoma.

FIGURE 187.

Diffuse carcinoma of the body of the uterus.<sup>1</sup>

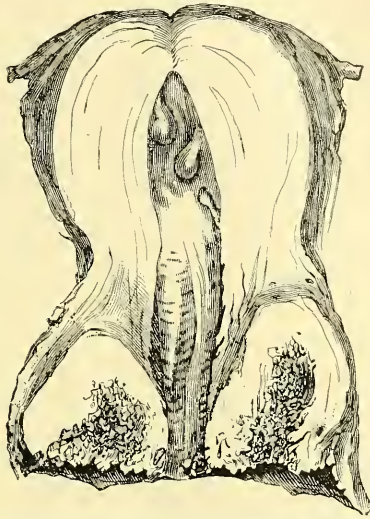
That form which, in early stages, confines itself to the superficial structures is sometimes called papillary or cauliflower cancer; it originates on the vaginal portion of the cervix, rapidly spreads to the vaginal walls, fills the upper part of the vagina, ulcerates early, and bleeds freely. The growth is soft, very vascular, and tends to speedy destruction of the cervix and vaginal walls.

<sup>1</sup> Ruge and Veit, in American System of Gynecology.



In rare cases the ulcerative process destroys and excavates the walls of the cervix before the growth appears outside on the vaginal portion.

FIGURE 188.



Carcinoma of the cervix, involving the parenchyma of the vaginal portion.<sup>1</sup>

FIGURE 189.



Carcinoma of the cervix uteri; cavity of cervix excavated.<sup>2</sup>

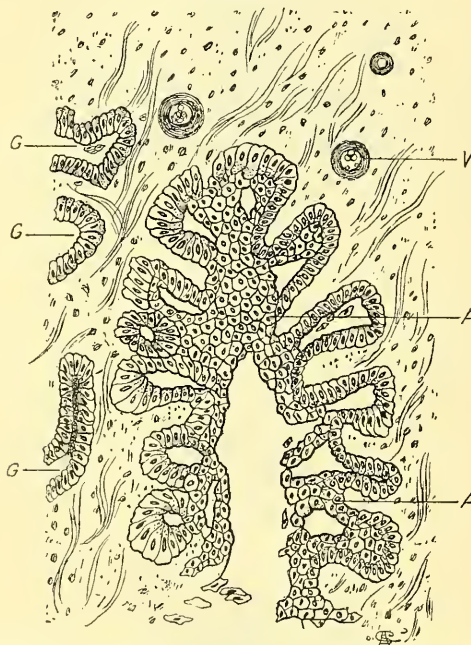
<sup>1</sup> Ruge and Veit, from American System of Gynecology.

<sup>2</sup> Ibid.

## Etiology.

The disease is more frequent among the white races than among the Africans and Asiatics. The lower classes of any race are more susceptible than the higher. Carcinoma is found very frequently in the cervix, somewhat less commonly in the corpus uteri. This is doubtless because the cervix is more exposed to the influence of coitus and to the trauma of parturition. The nulliparous uterus, especially the nulliparous cervix, is relatively immune. Laceration of the cervix is a clearly recognized predisposing cause. See Chapter XLII. Indeed, the disease rarely occurs on the non-lacerated cervix. It is rare before the age of twenty or after seventy; not uncommon between thirty and forty; most common between forty and sixty. The influence of heredity as a cause, though difficult to estimate, is considerable.

FIGURE 190.



Cylindrical-cell carcinoma. Transformation of typical to atypical gland structures.<sup>1</sup> A, A. Atypical transformation of the epithelial covering of the arbor vite. G, G. Normal glands. V. Vessels.

## Symptoms and Course.

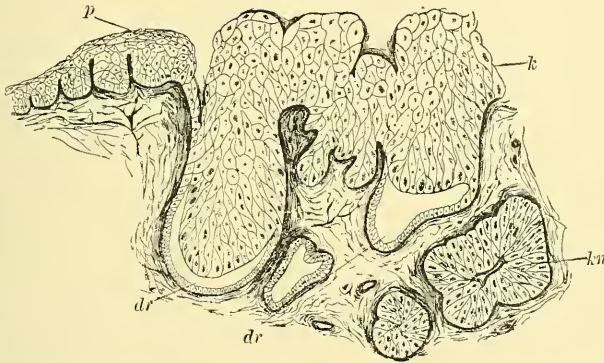
The symptoms in the early stages are absent. As the disease progresses the following disorders always appear :

1. Hemorrhage.
2. Uterine discharges.
3. Pain.
4. Visceral disorders.
5. Cachexia.

<sup>1</sup> From Bonnet et Petit.

1. **Hemorrhage** is usually the first symptom and is the result of ulcerative processes by which the bloodvessels of the growth are opened. It is, unfortunately, often attributed to the irregularities of the menopause or to a return of menstruation after that period; hence the fact that the bleeding of carcinoma is often disregarded until the disease has progressed beyond the hope of cure. The reappearance of hemorrhage one, two, three, or more years after the menopause is strong presumptive evidence of cancer, and demands immediate examination. The loss of blood, at first slight, is commonly noticed after straining at stool, or vigorous exercise, or coitus. With the progress of the disease the hemorrhage increases; it may be nearly or quite constant, may occur at irregular intervals, or in the form of menorrhagia at the catamenia. Usually the patient's strength is slowly exhausted by a persistent, slow seeping away of watery blood. On the other hand, profuse, even dangerous, hemorrhages are possible.

FIGURE 191.



Pavement-cell carcinoma, *i. e.*, epithelioma. Transformation of typical to atypical gland structures.<sup>1</sup>  
*p.* Pavement epithelium. *k.* Cancer. *kn.* Cancer nodules. *dr.* Remains of gland.

2. **Uterine Discharges.** A foul, most offensive, watery discharge commonly follows soon after the first appearance of the hemorrhage. Earlier this discharge may be serous, transparent, and inodorous; but, as ulceration increases, it becomes profuse, turbid, bloody, sometimes purulent, and always of a most nauseating odor. This symptom continues more or less constant to the end, and is characteristic of malignant disease. The discharge is called "carcinomatous ichor," or "cancer juice."

3. **Pain** is rarely present while the growth is confined to the vaginal portion of the cervix. Involvement of the corpus uteri and of the structures around the uterus may give rise to sharp, lancinating pains. These pains, though often described as pathognomonic, are by no means constant or confined to cancer. They may be supplemented by the pains of pelvic peritonitis. The peritonitis protects the general peritoneum by adhesions which form in front of the invading carcinoma. The pains are due to pressure on the pelvic nerves or to actual involve-

<sup>1</sup> Ruge and Veit, from American System of Gynecology.



ment of those nerves in the carcinoma; they are commonly referred to the region of the pelvis, perineum, or thighs, and usually indicate that the disease is past operative cure. The lower extremities become œdematous from hydræmia, from pressure, and from thrombosis of the pelvic veins. Emboli may be dislodged from the thrombi and carried to the lungs. The fatal result is then from embolism, septic pneumonia, and pulmonary œdema. The retention of secretions in the uterus from occlusion of the cervical canal by the invading carcinoma may give rise to hydrometra or pyometra, and cause spasmodic expulsive uterine pains like labor-pains.

Metastasis to the lungs, kidneys, liver, and other viscera is more common from carcinoma of the corpus than of the cervix.

4. **Visceral Disorders** may be consequent upon pressure or invasion of the neighboring organs. The bladder becomes irritable. Vesical catarrh, strangury, painful urination, pyuria, and cystitis may follow. Vesico-uterine or vesico-vaginal fistula often results from the destructive ulcerative processes. Uretero-uterine and uretero-vaginal, recto-uterine and recto-vaginal fistula may occur in the same way. Hydronephrosis and atrophy of the kidney, nephritis and uræmia are among the usual resultant complications. Constipation is explained as follows: First, the patient, through fear of pain and bleeding, voluntarily retains the feces; second, the feces become dry and hard from loss of water in the ichorous discharges; third, the bowel is incapacitated by the disease for the ready expulsion of its contents. Diarrhœa may be caused by irritation of the bowel from the invasion of the cancer. Alternating constipation and diarrhœa are common.

5. **Cachexia** appears not very late in the course of the disease, and is a characteristic symptom. It is marked by emaciation, a yellowish pallor of the skin, profound anæmia, and great depression both of mind and body. It is caused by sapræmia from the absorption of necrotic tissue and by malnutrition due to anorexia, vomiting, pain, and hemorrhage.

#### Diagnosis.

The sooner the carcinomatous uterus is removed the greater the protection against recurrence; hence the earliest possible diagnosis is imperative. The diagnosis is made by

The clinical history.

The physical signs.

Microscopic examination.

The **Clinical History**, as outlined in the foregoing paragraphs, gives strong evidence, though not proof, of cancer.

The **Physical Signs** are demonstrated by conjoined examination and inspection. The extremely fetid odor which clings to the examining finger, despite much washing and the prolonged use of the nail-brush, may usually be avoided by the free use of glycerin as a lubricant. The infiltrating carcinoma of the cervix is recognized as a thick, hard, more or less nodular friable growth. The friability is almost pathognomonic. The ulcers, if present, have the irregular, hard, raised margin, the uneven base, and bleed freely upon slight injury. Through the

speculum the surface before ulceration appears smooth or nodular, marble-like, and glistening. After ulceration the surface is ragged and irregular, and may show large excavations from the sloughing out of carcinomatous tissue. The entire cervix may disappear in this way. The papillomatous superficial variety appears as a soft, friable, bleeding, cauliflower-like mass.

*Carcinoma of the Cervix* in the beginning may be easily overlooked. The cervical wall around the external os may be only slightly thickened on the affected side. The indurated tissue may appear almost insignificant. Its extreme friability and persistent bleeding on slight abrasion will, however, be strong diagnostic factors. Subjective symptoms may even be absent. Excision of a small piece for microscopic examination is now imperative. This should be wedge-shaped, and should include a portion of the surrounding healthy tissue. The slight wound may be closed by one or two sutures. Cervical scrapings are usually unfit for examination.

*Carcinoma of the Corpus Uteri* in the beginning is often impossible to prove. It is apt to come between the ages of forty and fifty. There is increased and irregular menstruation. This is often wrongly attributed to the menopause. A slight watery discharge, even though odorless, if present, is highly diagnostic. If the discharge is very malodorous the evidence is much stronger. The general strength may be almost up to the normal standard. Conjoined examination shows nothing save, perhaps, a slight enlargement of the uterus. Life may now depend upon a speedy diagnosis. The whole question centres in the product of curettage and the microscopic findings. Should no microscopic evidence of cancer be found, the curettage must be repeated whenever the hemorrhage reappears. In cancer the discharge always recurs promptly. The scrapings are usually much more abundant than in benign growths. See Diagnosis of Benign Adenoma, page 327.

*Advanced Carcinoma* of the body of the uterus is recognized by the symptoms already described and by conjoined examination. The uterus is enlarged—often two or more times its normal size. It is hard, nodular, and, in the later stages, more or less fixed. Early fixation also occurs in cervical cancer. The causes of fixation are similar to those which produce the same condition in pelvic inflammation—*i. e.*, the extension of the disease through the lymph channels to the parametria. The absolute diagnosis may depend upon the microscope. The recognition, however, of advanced carcinoma, whether of the cervix or corpus, even without the microscope, is usually not difficult. "He who runs may read."

#### Differential Diagnosis.

The diseases most liable to be mistaken for carcinoma are :

Myoma.	Syphilis.
Benign adenoma.	Chronic metritis.
Incomplete abortion.	Laceration of the cervix.
Endometritis.	Ichthyosis uteri.
Sarcoma.	

Sloughing *myoma*, *benign adenoma*, *incomplete abortion*, and *endometritis* each has its own peculiar symptom-group. In typical cases this will suffice. In other cases the diagnosis must be confirmed by the microscope. The appearance of early carcinoma of the cervix may be almost identical with that of small cervical myomata, or hypertrophy. The diagnostic points are as follows: Myoma and inflammatory thickening—*i. e.*, hypertrophy—on section are hard and resisting. They are subject to erosion, but not to the more destructive process of ulceration. On the other hand, carcinoma is friable, marrow-like, and always ulcerates. *Sarcoma* has much the same clinical history as cancer, and is recognized only by the microscope.

*Syphilis* will be known by the clinical history. In doubtful cases specific treatment should clear the diagnosis. *Chronic metritis* shows a history of inflammation, is usually associated with endometritis, does not cause the carcinomatous cachexia, nor the offensive watery discharge. On conjoined examination the uterus is symmetrical, while carcinomatous uterus is often nodular.

*Laceration of the cervix* is characterized by inflammatory and mechanical results which may closely resemble carcinoma of the cervix. See Pathology and Diagnosis of Laceration of the Cervix.

*Ichthyosis Uteri*. This condition is marked by the presence of two or more layers of stratified epithelium, and was first described by Zeller,<sup>1</sup> 1884. The presence of stratified epithelium in the cavity of the uterus has been observed in connection with inversion of the uterus, cervical polypi, and, according to Zeller, chronic endometritis. Much of the columnar and pavement form of epithelium also occurs in hydrometra and hæmatometra and extra-uterine pregnancy. It may occur where, from any cause, the mucosa is stretched and flattened out so as to transform the columnar into the pavement epithelium. The condition gives rise to no unusual symptoms except such as would ordinarily be observed in endometritis or in the beginning of carcinoma in corpus uteri. The scrapings of stratified epithelium under the microscope may have the same appearance in ichthyosis uteri and carcinoma uteri. If the microscopic findings show that the stratified epithelium is limited to the superficial structures, the case is one of ichthyosis uteri. If the epithelium penetrates the underlying connective tissue it is carcinoma. Just as benign adenoma or glandular hypertrophy may be the starting-point of carcinoma, so ichthyosis may precede the development of carcinoma. See Benign Adenoma, page 325, and Pathology of Carcinoma, page 329.

#### Causes of Death.

Hemorrhage, although it may slowly exhaust the vitality, is rarely a direct cause of death. Fatal peritonitis seldom occurs from extension of the disease. In the vast majority of cases death is from marasmus or uræmia, or both.

<sup>1</sup> Zeller: Plattenepithel im Uterus (ichthyosis uterina). Zeitschrift für Geburtshilfe und Gynäkologie, Band xi. Ries: Eine neue Operationsmethode des Uteruscarcinoma. Zeitschrift für Geburtshilfe und Gynäkologie, Band xxiv. Ichthyosis, American Gynecological and Obstetrical Journal, February, 1896.



### Prognosis.

The sole hope of radical cure is in the surgical removal of the carcinoma. All drugs are of questionable value, or useless. If the growth has progressed beyond the limits of a radical operation, death in the near future is inevitable. The disease will sometimes destroy life in a few months or weeks; it may for a time become apparently inactive, or develop very slowly, and then go on to a rapid termination. The prognosis as to the limit of life should be guarded. A general statement that death is more liable to occur within one year than after two years would be safe.

### Treatment.

The treatment is radical when the disease has not extended beyond the limits of its entire removal, palliative when it cannot all be removed. The radical treatment should always be complete hysterectomy. The old practice of high amputation of the cervix for cervical cancer should never be done, for one can never be certain that the disease is not also present and unrecognized in the corpus uteri. It may have developed there in either one of three ways: 1. It may have extended from the cervix to the endometrium; 2. The corpus may have an independent growth; 3. Carcinomatous emboli may pass from the cervix to the lymphatics of the corpus and be entirely unrecognizable except by the microscope. The removal of the growth by the galvano-cautery, except as a palliative measure, is not generally approved.

*Indications and Contraindications for Hysterectomy.* Hysterectomy is indicated if the disease is limited to the uterus. Such limitation will be inferred: 1. By the normal mobility of the uterus; 2. By the absence of any enlargement of the lymphatic glands in the parametria; 3. By the absence of the disease on the vaginal walls. Enlargement of the glands is evidence that the disease has extended beyond the uterus. This does not positively contraindicate hysterectomy, but renders the prognosis less favorable. Whether enlarged or not, they should, if practicable, be removed. The relation of these glands to the carcinomatous uterus offers a close analogy to the relations of the axillary and subclavian glands to cancer of the breast. Extension of cancer to the vaginal walls, if slight, does not definitely contraindicate hysterectomy, provided the diseased portion of the vagina can be removed with the uterus. Extensive involvement of the vagina and fixation of the uterus in surrounding cancer contraindicate the operation.

When the disease has passed beyond the hope of radical cure, but not beyond the limits of palliative hysterectomy, the operation is sometimes done for the temporary relief of symptoms; its benefits, however, are not usually sufficient to outbalance its dangers.

## VAGINAL HYSTERECTOMY.

The vaginal route for the removal of the carcinomatous uterus is usually preferred. Two methods of hæmostasis are in use: first, by forcipressure;<sup>1</sup> second, by ligature.

## Vaginal Hysterectomy with Hæmostasis by Forcipressure.

The technique of the operation with hæmostasis by forcipressure is as follows: The patient is placed in the lithotomy position, and the vagina disinfected. See page 42. Any cancerous disease around the external os may be scraped off with the curette or burnt off with the actual cautery, the cervix plugged with a small strip of gauze, and the os closed with one or more sutures. This will confine the uterine secretions and keep them away from the peritoneum and field of operation, a most important precaution, for contact of cancer tissue with the wound has often resulted in the transplantation of the disease and new infection. The author once observed a commencing cancer on the abraded perineum three weeks after hysterectomy. This was at once thoroughly excised, and the wound closed as in perineorrhaphy. The patient was free from cancer three years later. After closing the os externum, again disinfect the vagina. Expose the cervix with one or two Simon's retractors; seize it with the strong vulsellum forceps and draw it toward the vulva.

At this point inspect well the vaginal tissue around the cervix. The permanency of the result, especially in cervical cancer, will often depend upon the removal with the uterus of a considerable portion of the adjacent vaginal tissue.

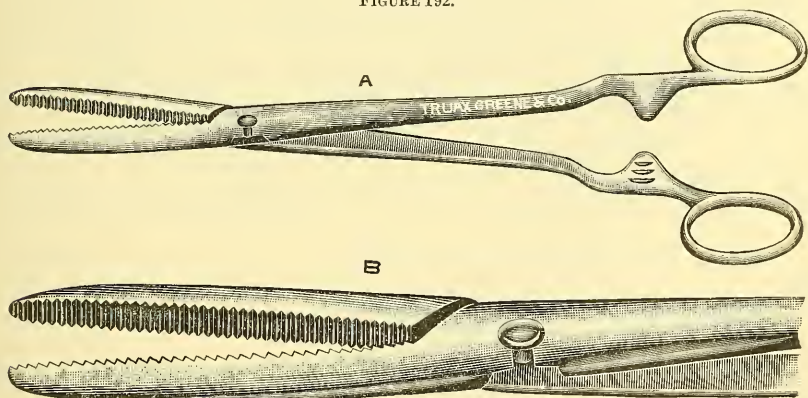
A free incision with the scissors is now made all around the cervix at a safe distance from the disease. The loose tissues around the cervix are easily stripped back by means of the finger or handle of the scalpel, keeping as close to the uterus as the disease will permit. Control small bleeding-points by catgut ligature. In this way the circumuterine structures may be stripped back from the uterus until the exposure of the cervix is measured by a zone three-quarters of an inch or more wide. This zone extends anteriorly and posteriorly to the anterior and posterior utero-peritoneal reflections and on either side to the broad ligament. The uterus can now be drawn down much lower, and, with the bladder thus separated from the uterus, the ureters, which lie close to the uterus, can be easily avoided. The post-cervical structures are now further separated by means of the finger or the handle of the scalpel, or the closed blunt scissors, until the cul-de-sac of Douglas is opened. This opening is easily enlarged by introducing the two index-fingers and tearing laterally to the region of the broad ligaments. A large gauze sponge, with a string attached to

<sup>1</sup> Péan: Gazette des Hôpitaux, Paris, 1888. Leçons de Clinique Chirurgicale de l'Hôpital St. Louis, tom. i., ii., iv., v. Richelot: L'Union Médicale, 3d series, vol. xlii. pp. 85-91. Paris, 1886. *Ibid.*, p. 274. Paris, February 19, 1880. Secheyron: Report of the Academy of Medicine, Paris, 1887. Terrier, F.: Revue de Chirurgie, Paris, 1888. E. C. Dudley: Transactions American Gynecological Society, 1888, vol. xiii.

facilitate its removal, is now forced through into the cul-de-sac of Douglas. This will protect the pelvic viscera and absorb blood during the remainder of the operation.

The peritoneal edge of the post-uterine wound is now united to the vaginal edge by means of a continuous catgut suture. A like opening anterior to the uterus between the uterus and bladder is also made into the peritoneal cavity. As was done posteriorly, this opening is enlarged to the region of the broad ligaments by lateral tearing with the index-fingers, and its peritoneal edge is stitched to the vaginal edge. The whip-stitch by which this is done anteriorly and posteriorly reduces the size of the wound and prevents bleeding, and thereby simplifies the operation. The anterior opening may sometimes be more easily made by passing the index-finger through the posterior opening, and, if possible, hooking it over the broad ligament, so that it may serve in some degree as a guide, and thereby prevent the operator from wounding the bladder, ureters, or anterior uterine wall. Then the index-finger of the left hand or a blunt hook is hooked over the left broad ligament, the ligament is drawn down and seized by hæmostatic forceps, the grasp being at a sufficient distance from the uterus to prevent the instruments from slipping off after the organ has been

FIGURE 192.



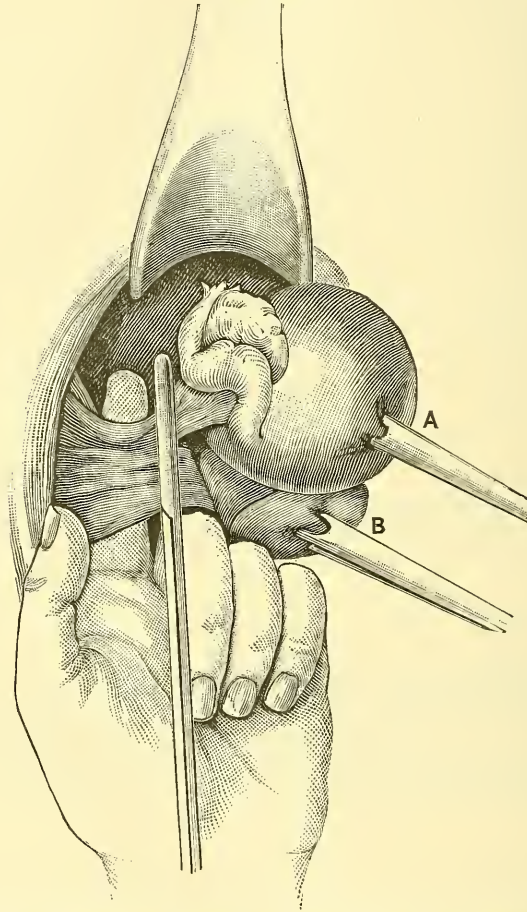
Forceps for clamping the broad ligaments.

severed. These forceps are constructed on the principle of Péan, but should be heavier and with jaws about two inches long. Various broad ligament clamps have been devised, but none fulfils the indication better than the straight, strong hæmostatic forceps. The forceps handles are securely locked, the ligament is severed close to the uterus, and the whole uterus is pulled outside. The organ now hangs by the other broad ligament. This in turn is clamped in the same way, and the uterus is removed by a few strokes of the scissors. The ovaries and Fallopian tubes, unless already included with the broad ligaments, may be secured by separate forceps. If, upon examination, the operator fears that the broad ligament is diseased beyond the grasp of the forceps, he may put on other forceps back of those first applied. The first



forceps may then be removed and the suspected tissues cut away. Fatal hemorrhage has resulted from the slipping of the broad ligament forceps; hence the necessity of so making the incision through the ligament as to leave considerable tissue on the distal side of their jaws. To prevent the forceps' handles from snapping apart, they should be securely tied together with strong thread.

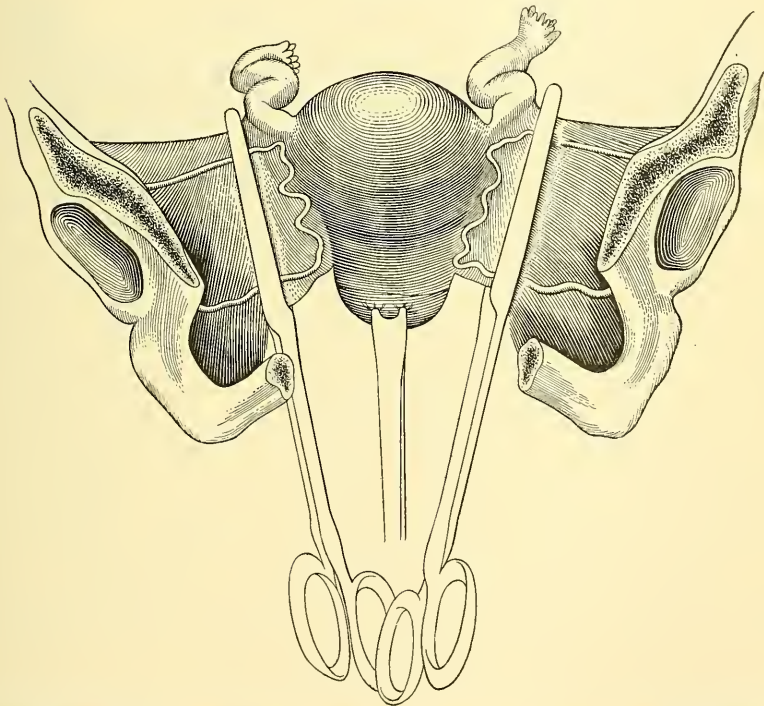
FIGURE 193.



Uterus anteverted and corpus drawn through into vagina; right broad ligament being drawn down by index-finger and clamped by forceps. A. Corpus uteri. B. Cervix uteri.

In many cases the uterus is much enlarged, and the ligaments therefore on either side extend so high in the pelvis that they cannot be drawn down within the grasp of a single pair of forceps. Then one pair of forceps may be put on, and that part of the ligament in their grasp divided. The uterus can then be drawn further down, and the remaining portion of the ligament, having been clamped by one or more forceps, may be severed. If so much space in the vagina is occupied

by forceps as to impede the operator, a single forceps may be applied back of two or more, and the latter then removed. Some operators leave the vaginal wound open for drainage with or without gauze packing. If no packing is used the peritoneal margins of the wound usually fall together and promptly unite. Numerous cases, however, of annoying intestinal adhesions, protrusion of the bowel, fecal fistula, intestinal obstruction, and peritonitis prove the danger of this practice. The wound may be closed by the continuous or interrupted catgut suture. If drainage is required, a small rope of twisted gauze or a rubber tube, or both, may be inserted between the sutures precisely as would be done in closing any other wound. The vagina is then lightly packed with gauze, an absorbent dressing is held upon the vulva by a T-bandage, and changed often enough to keep it dry.

FIGURE 194.<sup>1</sup>

Broad ligament on both sides entirely in the grasp of forceps. In actual practice it is usual to clamp and sever the left ligament first, and then the right.

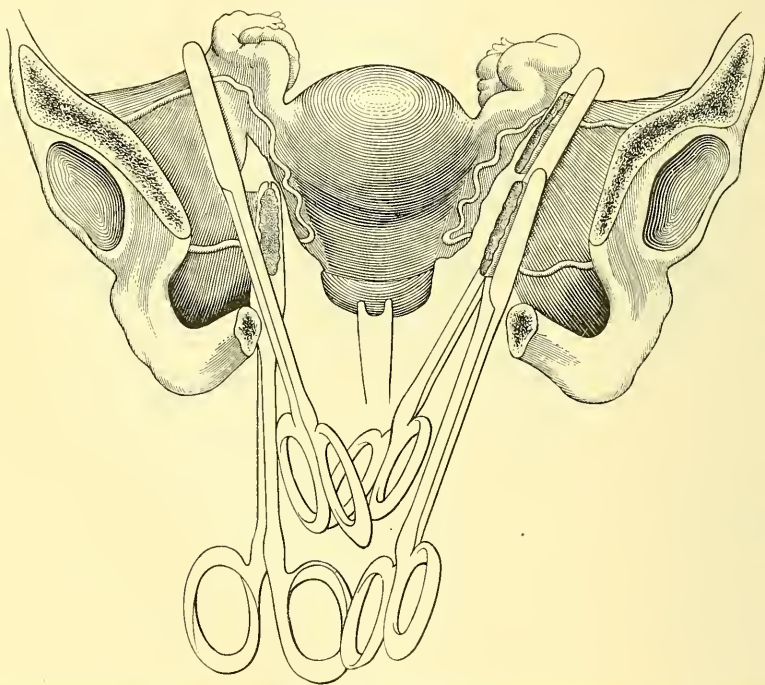
Whenever practicable the broad ligament stumps should be drawn down into the vagina and fixed there by catgut sutures, so that everything included in the bite of the forceps may be in the vagina. The advantage of this is threefold: 1. All traumatisms, save the simple

<sup>1</sup> Figures 194, 195, 196 and 198 are suggested by those of Baldy and Penrose, of which they are modifications.

peritoneal wound, are excluded from the peritoneum. 2. The ligaments, when united to the upper end of the vagina, support the pelvic floor, and with it the rectum, bladder, and vagina. 3. Enterocele vaginalis is prevented. See Figure 196.

Rectovaginal and vesicovaginal fistulæ are occasionally the result of vaginal hysterectomy. Should such accident occur, the repair is simple. In uniting the peritoneal edges to the vaginal edges of the wound anterior and posterior to the uterus by the whip-stitch already described, it is only necessary to use additional interrupted sutures at the point of the fistula. These sutures should not be buried, but should include the peritoneal and vaginal margins. The strong tendency of peritoneal surfaces to adhere to any exposed surface renders union almost certain.

FIGURE 195.



Two broad ligament forceps on each side in place. Ligament severed on one side and partly severed on the other.

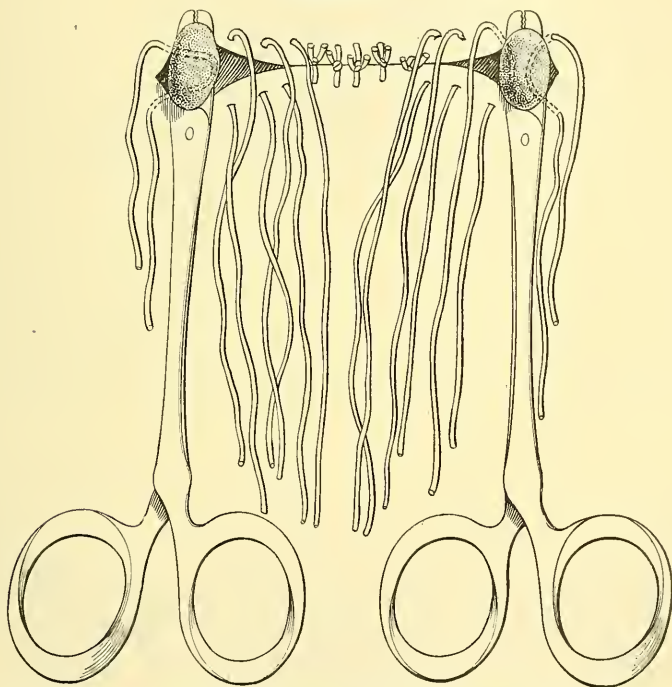
#### Vaginal Hysterectomy with Hæmostasis by Ligature.

Hæmostasis by ligature involves no very material change in technique save the use of ligatures in place of pressure forceps. After the anterior and posterior openings already described have been made, and the broad ligaments have been isolated, each ligament may be transfixed and tied *en masse*, or, if very large, in sections. The application of the ligature may be facilitated by retroverting or anteverting the uterus, and by means of vulsellum forceps drawing the corpus either through the



anterior or the posterior opening. This twists the ligaments upon themselves, makes them smaller, and brings their upper margins nearer to the operator. Separate ligatures are usually needed for the uterine appendages. The following cuts will show the technique of the operation. Each ligament is usually ligatured in two or three sections. The ligatures—preferably catgut—are passed by means of aneurism needles, or with the ordinary threaded needle and forceps. Successive portions of the ligament on either side are progressively tied and cut away from the uterus until the organ is finally removed. In many cases the hysterectomy is facilitated by dividing the uterus into two halves. Each half may then be drawn through the vagina separately

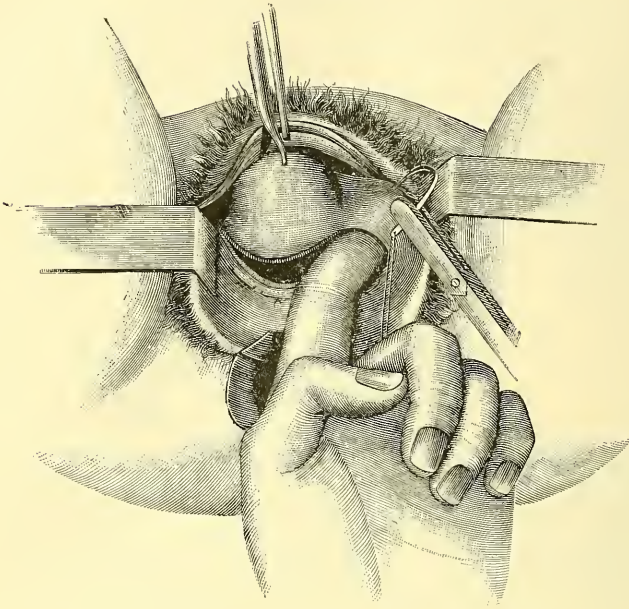
FIGURE 196.



Ends of broad ligament stumps fixed by forceps and sutures in the ends of vaginal wound. Sutures alone are sometimes used.

and removed. The ends of the ligatures, having been left long, are now used to draw the stumps down into the vaginal wound, where, as in the forcipressure operation, they are fixed not by forceps but by the sutures which are used in the closure of the wound. The ligatures are now cut short. If the stumps will not reach to the vagina, their ligatures are cut short, and they are returned to the pelvic cavity. Sometimes all the stumps are too short, and therefore must be treated intraperitoneally. The vaginal wound would then be closed as the condition may require, with or without the gauze drain. See chapter on drainage.

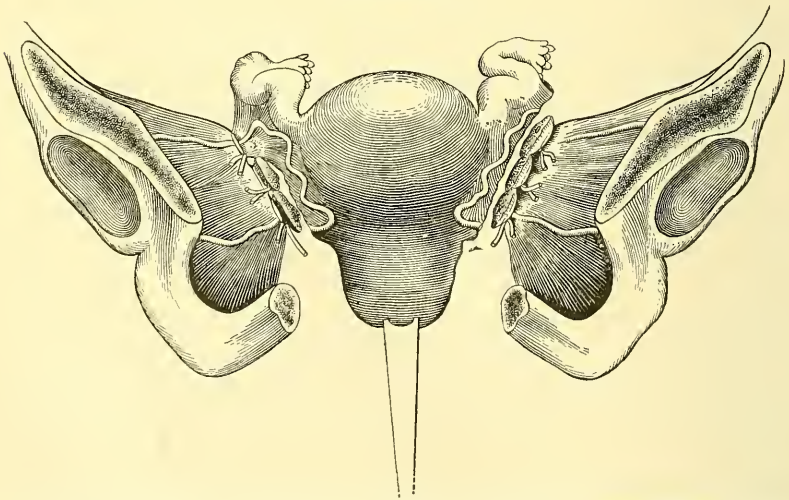
FIGURE 197.



Application of the progressive ligature to the broad ligament.<sup>1</sup>

After-treatment. The general management differs in nothing from that of ordinary abdominal section. The forceps and vaginal gauze and

FIGURE 198.



Broad ligaments secured by three *en masse* ligatures on each side. Ligament severed on left side and partly severed on right.

<sup>1</sup> After August Martin, in American System of Gynecology.

the drain, if there be one, should be removed at the end of forty-eight hours, and a one-half of 1 per cent. lysol douche given. If the wound has been left open and packed with gauze great care should be used lest in its removal a loop of intestines be drawn into the vagina. The douche may be repeated daily, or, if the discharges are fetid, oftener. Let the douche be a weak current, lest it force its way through the fresh adhesions into the general peritoneum.

#### Relative Merits of the Ligature and Forceps Operation.

*The advantages of pressure-forceps* over the ligature are: 1. The greater facility of their application very materially shortens the operation; therefore in a difficult case, with inaccessible broad ligaments, they are safer. 2. The forceps may be made to grasp a considerable portion of the broad ligament. The ligament may be drawn down and grasped further back by another forceps. More of the ligament may in this way be included than would be possible with the ligature. Whatever the forceps grasp will slough; by this means a very large portion of the ligament may be destroyed. Some part of the disease which the ligature might have missed may therefore be removed with the slough. 3. The forceps facilitate drainage. The secretions find their way out along the solid instrument by continuity of surface. 4. If the forceps are properly constructed and applied the security against secondary hemorrhage is very great.

*The disadvantages of the forceps* as compared with the ligature are: 1. They cause great suffering to the patient. 2. Their removal is painful. 3. Convalescence is apt to be more protracted and complicated.

The ligature and forcipressure operations are both efficient and both satisfactory; therefore, whichever is most convenient or will most facilitate the operation should be used. The forceps will always be preferable in grave cases, especially when the ligaments are very thick and inaccessible. Ofttimes both methods will be useful in the same case.

#### Combined Operation of Abdominal and Vaginal Section.

When the vulva and vagina are small and the uterus is large, high in the pelvis or fixed, its removal through the vagina will be very difficult. Under these conditions, after making the vaginal incisions and separating the cervix from its surroundings, as already described, the operation may be better finished through an abdominal opening. The technique is the same as that already described for hysteromyomectomy.

#### Mortality of Hysterectomy for Cancer.

In properly selected cases—see Indications for Hysterectomy—the mortality of vaginal hysterectomy for cancer is small. In one series of more than fifty consecutive cases the author had no death. Out of about ten combined operations in which the abdomen also was opened he had two deaths.



### Recurrence of Carcinoma after Hysterectomy.

The recurrence of cancer of the uterus after hysterectomy is less frequent than after its removal from other parts of the body. Even in cancer of the breast, where from its exposed location the diagnosis is usually made earlier than in the uterus, recurrence is much more frequent. This is true notwithstanding the common practice of thorough removal of the subclavian and axillary glands in connection with the breast operations, and notwithstanding the fact that in the usual hysterectomy the parametric glands are seldom removed. The statistics of the best operators show freedom from the disease two or more years after vaginal hysterectomy in from about 40 to 60 per cent. of all cases.<sup>1</sup>

In order to prevent recurrence of the disease the usual rule for the removal of cancer in other regions applies—*i. e.*, complete removal of all the apparently diseased tissue and of as wide a margin of adjacent tissue as safety will permit. This rule is based upon the invariable tendency of cancer to follow the vessels, especially the lymph vessels, into the surrounding structures.

### More Radical Operations of Hysterectomy.

More radical operations are proposed for the further prevention of recurrence, but thus far with little encouragement, *viz.*, the removal of all peri-uterine and lumbar glands<sup>2</sup> and the excision of the broad ligaments close to their pelvic attachments.<sup>3</sup> Both of these procedures require coeliotomy and greatly increase the traumatism. The removal of the broad ligaments involves the following steps: 1. The uterine artery on each side must be dissected out beyond its vaginal branch and tied. 2. The ureters must be dissected free from the base of the broad ligaments. 3. To avoid wounding the ureters they must each contain a bougie passed after the method of Kelly through the urethral speculum. The increased traumatism, great difficulty of technique, and, above all, the time required for all this would probably increase the mortality of the operation enough to offset any possible advantage.

The difficulty and danger of the removal of broad ligaments and all the lymphatic glands in connection with the hysterectomy for cancer, will be apparent from examination of Figure 196.

### Palliative Treatment.

When cancer has extended to the bladder or rectum, or has materially involved the vagina or parametria, and especially when the uterus is fixed, hysterectomy is extra-dangerous and useless. Unfortunately, the onset of the disease is so insidious that the early symptoms of pain, hemorrhage, and watery discharge are either overlooked or attributed to other causes; hence the diagnosis is not usually made until too late for radical cure; then palliative treatment can hold out at best

<sup>1</sup> American Text-book of Gynecology, p. 386.

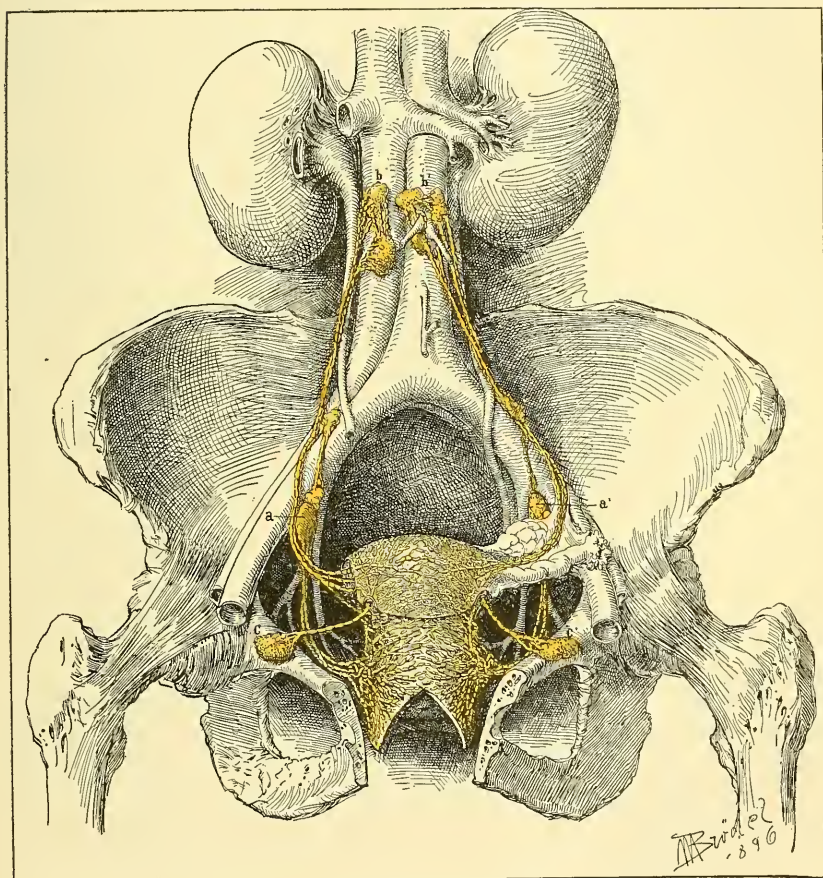
<sup>2</sup> Ries. Modern Treatment of Cancer of the Uterus. Chicago Medical Recorder, November, 1895.

<sup>3</sup> J. G. Clark. Johns Hopkins Bulletin, xlii., xliii., July and August, 1895.

only relief from suffering during the few months of remaining life. This treatment is both local and systemic.

The object of local treatment is to check the exhausting hemorrhages and discharges. This is best accomplished by sharp curettage of the more superficial, soft, ulcerating portion of the cancerous growth. Remember that the disease may extend through the vesical, rectal, or uterine walls, and that, without care, the bladder, bowel, or peritoneum may be opened. The redundant cancerous mass having been removed,

FIGURE 199.

Lymphatics of uterus and upper third of vagina.<sup>1</sup>

the surface thus exposed should be seared over with the Paquelin caутery, or cauterized with nitric acid or with an 8 per cent. solution of chromic acid.

The cancerous growth may be kept down and the fetid discharges at the same time deodorized by the application every three or four days

<sup>1</sup> After Clark, in American Journal of Obstetrics.

of a saturated solution of iodine crystals in pure carbolic acid. This application is best made on small tampons. The healthy parts of the vagina may be protected by covering the mucosa with gauze pads.

Deodorizing douches are useful to destroy the nauseating fetor of the discharges. Among the best of these are peroxide of hydrogen, a 2 per cent. solution of permanganate of potash, a weak solution of formalin, or liquor sodæ chlorinatæ, one part to ten parts of water.

The hemorrhage is best controlled by the curette and cauterization, already described. A sudden profuse hemorrhage may be checked by a douche of hot water, hot vinegar, or hot alum solution. Should the vaginal tampon be used, it will become intolerably offensive, and should therefore be removed in twenty-four hours. The erosion and excoriations of the external genitals and nates, which are caused by the ichorous discharges from above, may be relieved by frequent bathing and the application of benzoated oxide of zinc ointment.

*The general treatment* includes regulation of the bowels and kidneys, tonics, nutritious food, mild exercise, and massage. Pain is a clear indication for morphine or opium. Life will be limited to a few months; hence the danger of the opium habit is not significant. Numerous drugs, both for local and systemic use, have been lauded as cancer cures. They are, so far as their merits have been investigated, useless.

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## CHAPTER XXX.

### TUMORS OF THE UTERUS.—SARCOMA AND DECIDUOMA MALIGNUM.

#### SARCOMA.

SARCOMA is a malignant tumor belonging to the connective-tissue group. As compared with carcinoma, it is of rare occurrence. The disease, which may appear at any time during the age of sexual maturity, has been observed as late as the age of seventy. Like cancer, it is more frequent at about the period of the menopause—that is, between forty and sixty.

#### Histogenesis.

Sarcoma may develop from any of the following sources: 1, the interglandular connective tissue of the endometrium; 2, the intermuscular connective tissue of the myometrium; 3, the walls of the blood-vessels; 4, the perivascular connective tissue; 5, the muscle cells;<sup>1</sup> 6, any of the structures of a uterine myoma.

<sup>1</sup> Whitridge Williams. American Journal of Obstetrics, 1894, vol. xxix.



## Pathological Anatomy.

Three well-defined clinical forms have been described :

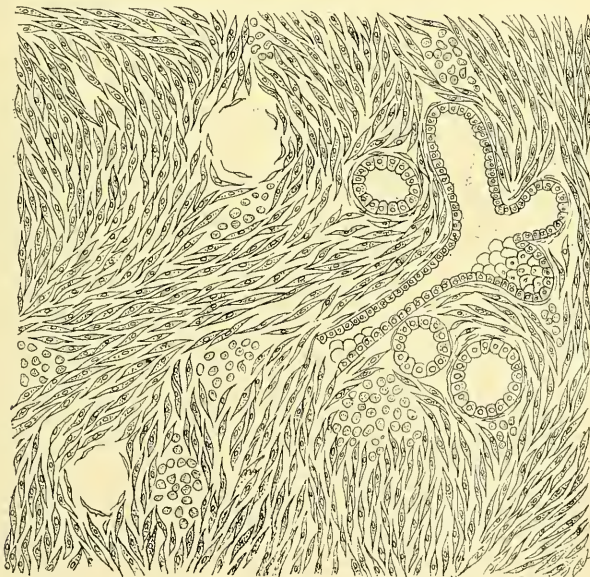
*a.* Fibrosarcoma.

*b.* Diffuse sarcoma.

*c.* Butryoides—grape-like sarcoma.

*a.* Fibrosarcoma, often called interstitial sarcoma, is the form that develops in the intermuscular connective tissue. It is also frequently the result of the so-called sarcomatous degeneration of a myoma. Like myoma, the growth may be submucous, intramural, or subserous ; its form and consistency are variable—*i. e.*, round, oblong, or irregular, soft, or hard. The disease may be circumscribed or diffuse. Its frequent origin from a myoma often gives it the appearance of that tumor—*i. e.*, of single or circumscribed nodules scattered throughout the uterus. The growth is rarely encapsulated, though usually well defined. The characteristic cells are round or spindle. The spindle cell more frequently predominates. These cells are often so elongated as to appear like fibrous tissue ; hence the name fibrosarcoma.

FIGURE 200.



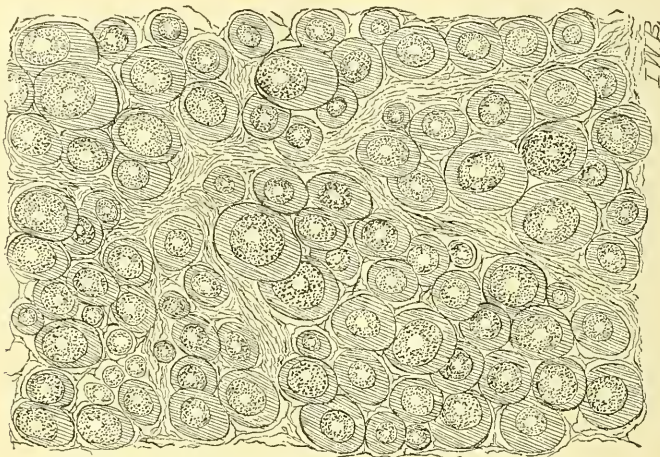
Fibrosarcoma or spindle-cell sarcoma. Semi-diagrammatic.<sup>1</sup>

*b.* Diffuse Sarcoma usually develops from the interglandular connective tissue of the endometrium. In this form the small round cell usually predominates over the spindle cell. The growth may be confined to separate areas, or may infiltrate the whole endometrium and rapidly involve the entire uterus and adjacent organs. It develops

<sup>1</sup> American System of Gynecology, vol. ii. p. 227.

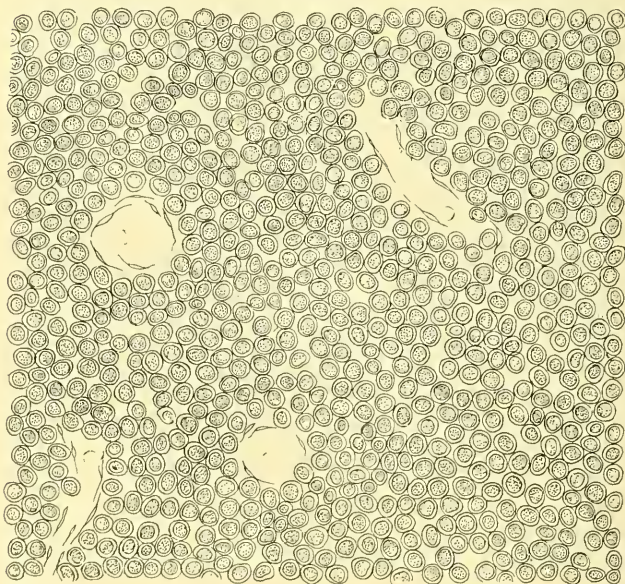
both toward the endometrium and peritoneum. Intra-uterine sarcoma may take the form of numerous soft medullary polypi. When removed by the curette they have the gross appearance of carcinoma.

FIGURE 201.



Alveolar, large round-cell sarcoma. Semi-diagrammatic.<sup>1</sup>

FIGURE 202.



Small round-cell sarcoma. Semi-diagrammatic.  $\times 400^2$

c. *Butryoides* or Grape-like Sarcoma is extremely rare, and usually originates in the cervix. It has the form of cyst-like masses resem-

<sup>1</sup> American System of Gynecology, vol. ii. p. 227.

<sup>2</sup> *Ibid.*, p. 231.



bling hydatid moles. The growth is composed mostly of round and spindle cells; it has been observed in the uteri of adult women and children, and in the vagina of children.<sup>1</sup> The development of this extremely malignant growth is most rapid.

Other varieties of cervical sarcoma are still more rare.

All sarcomata, especially the diffuse, are extremely vascular. The bloodvessels are sometimes so enormously dilated as to form cavernous spaces. The lymph spaces may dilate into cystic cavities.

**Symptoms, Course, and Diagnosis.** The symptoms and course vary with the different forms of sarcoma. The interstitial spindle-cell sarcoma, formerly called recurring fibroid, is sometimes of slow growth. In exceptional cases it may not destroy life for several years. The diffuse, small round-cell sarcoma, on the contrary, is ordinarily much more malignant than carcinoma; it often goes on to a fatal result in a few months. The tendency of sarcoma is to scatter its nodules through the uterine walls, to penetrate the bloodvessels, to extend to the peritoneum, and to involve adjacent organs. The thickened, enlarged uterus, the bladder, and the neighboring intestines are now matted together in the sarcomatous disease and materially increase the size of the tumor. The disease is prone to send its emboli by the veins to the lungs, liver, kidney, spleen, and brain. These and other organs may now become rapidly involved in metastatic sarcoma. It is a peculiarity of the disease that emboli pass through the veins to distant organs. In this respect it differs from carcinoma, which is apt to travel by the lymphatics and to be arrested by thrombic plugging at points much nearer to the original seat of the disease. The symptoms and clinical course of interstitial sarcoma in the beginning may so closely resemble those of myoma as to make the clinical diagnosis wholly unreliable. The clinical course and physical signs of this variety in the later stages are almost identical with those of cancer.

When sarcoma takes the place of myoma the growth rapidly increases. Hitherto painless, it now causes intense suffering. Hemorrhages are increased and supplemented by watery, sanious discharges, which, after ulceration and gangrene, have an offensive odor. There is a facial expression of distress. The general depression is out of proportion to the anæmia and inanition. Pressure symptoms, cachexia, and emaciation are more and more pronounced, and of very rapid development. If the sarcoma becomes polypoid the pain from uterine contractions is spasmodic, and hemorrhages are frequent and prolonged.

Positive diagnosis is only possible by the microscope.

**Treatment.** The treatment, both radical and palliative, is the same as for carcinoma, viz., early hysterectomy, if possible. Unless all the disease can be removed, the operation hastens death, for it opens the venous channels, and thereby favors metastasis. Palliative hysterectomy—a questionable remedy in carcinoma—is therefore prohibited in sarcoma. See Hysterectomy for Cancer.

<sup>1</sup> Peck. From Playfair's System of Gynecology, p. 726.



FIGURE 203.

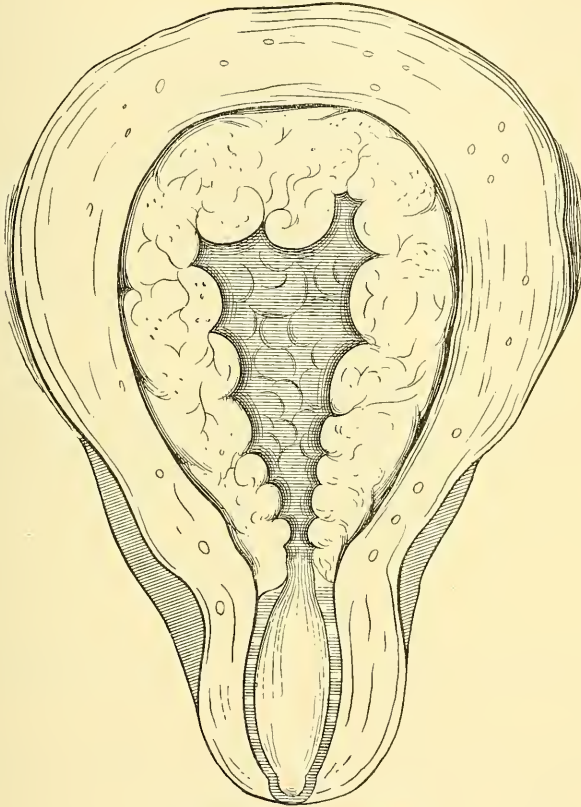


Butryoides, grape-like sarcoma. The microscopic findings show spindle cells. Some of the cells present a cross striation.

Deciduoma Malignum.

Pathology. This disease, first described in 1889,<sup>1</sup> is the most malignant of all uterine tumors. The growth is composed of and characterized by decidual or placental elements, and differs essentially from

FIGURE 204.



Sarcoma of the endometrium.<sup>2</sup>

EXPLANATION OF FIGURE 203 (on page 352).

1. Cervix uteri, with tumor hanging from it (natural size). Sound passed through cervical canal. *L*, a line of excision; *a*, *a*, and *b*, berry-like growths; *c*, fragments of delicate epithelial membrane covering a number of the berries.
2. Section of a berry hardened in alcohol (Bénèche, Oc. 3, Obj. 7); *a*, type of stroma; *b*, numerous interlacing striated muscular fibres; *c*, fibres in which the striæ cannot yet be seen; at times, *e*, these fibres are cut transversely.
3. Cells from the third tumor, fresh specimen; *a*, stellate cell with numerous nuclei; *b*, spindle cells with one long nucleus; at *c* the ends of the spindle fatty; *d*, spindle cells, with several nuclei; *e*, fatty débris with free nuclei, partly fatty.
4. Striated spindle cell from the first tumor.
5. Muscle fibres from a five to six weeks' old embryo.<sup>3</sup>

<sup>1</sup> Sänger. A System of Gynecology, by Playfair, p. 737.

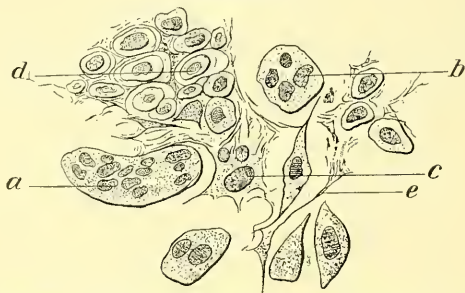
<sup>2</sup> Bonnet et Petit. Gynecologie.

<sup>3</sup> From Pernice, in Thomas and Mundé, Diseases of Women.

all other neoplasms; its essential cell element is a large giant cell, Figure 205. This cell is embedded in a kind of cellular tissue which resembles sarcoma, and which makes up the greater part of the growth. The presence of so much sarcoma-like substance has raised the question whether the disease is not essentially sarcoma. On the other hand, the tumor is epithelial,<sup>1</sup> "the tissue combining in its formation being: 1. Syncytium—*i. e.*, the uterine epithelial layer of the chorion. 2. The element of the so-called cellular layer—layer of Langhans—*i. e.*, the ectodermal epithelial layer of the chorion." The question has therefore also been raised whether the growth is not carcinoma. The classification, however, is *sub judice*. The disease has been called *syncytioma*, *sarcoma*, *deciduo cellulare*, and serotinal tumor.

The growth is rich in blood-supply;<sup>2</sup> the blood is confined within irregular spaces; the vessels have no walls; hence the frequent hemorrhages. Necrotic changes take place early. Under the necrosed tissue is solid tumor, and under this normal uterine tissue. In the development of the growth the normal constituents of the uterine wall are rapidly replaced by invasion of giant cells and small, round connective cells.

FIGURE 205.



Fragment of deciduoma. *a.* Decidual cell with thirteen nuclei. *b.* Same, with four nuclei. *c.* Giant cell in process of formation, with three nuclei. *d.* Uninuclear decidual cell enclosed in reticulated stroma. *e.* Reticulated stroma.<sup>3</sup>

**Symptoms and Diagnosis.** Profuse hemorrhage occurring after labor or abortion is the most characteristic symptom; it is intermittent and commonly so profuse as to cause profound anæmia. Curettage gives but transient relief. The discharge is profuse, watery, and often foul-smelling. Hydatid-like moles may be discharged with the hemorrhage. The uterus rapidly enlarges. Metastasis takes place by the venous route, most commonly in the lungs, and gives rise to symptoms referable to the newly infected part. Anæmia, emaciation, and cachexia follow in rapid succession. Unless the disease is removed by early hysterectomy, death in a few months is inevitable. Physical examination will show an enlarged uterus, movable or fixed by adhesion. Smooth, secondary nodules may be felt on the tubes. The uterine cavity may be sufficiently open to admit the finger. Digital

<sup>1</sup> Marchand. From Playfair's System of Gynecology, p. 737.

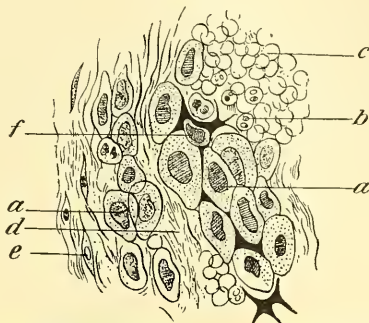
<sup>2</sup> H. M. Jones. A Clinical and Pathological Study of Deciduoma Malignum. Johns Hopkins Hospital Reports, vol. vi.

<sup>3</sup> Sängner, from Pozzi.



exploration will then detect coagula of blood and soft masses, usually localized in the wall of the fundus. The above history and symptoms are highly diagnostic. Microscopic examination of the scrapings will clear the diagnosis.

FIGURE 206.



Fragments of deciduoma from same specimen as shown in Figure 205. *a.* Decidual cells. *b.* Leucocytes. *c.* Blood-corpuses. *d.* Intermuscular cellular tissue. *e.* Fusiform cells. *f.* Reticulum.<sup>1</sup>

**Treatment.** Prophylaxis requires thorough removal of all retained products of conception and prompt attention to post-abortion and puerperal hemorrhages. The surgical treatment is the same as that already laid down for carcinoma, viz., early hysterectomy.

## CHAPTER XXXI.

### SOLID TUMORS OF THE OVARY.

Fibroma. Myoma. Sarcoma. Carcinoma.

THESE tumors, like paroöphorotic cysts, may develop between the folds of the broad ligament. They are then called intraligamentous. Usually, however, solid ovarian tumors are pedunculated and lie entirely outside of the broad ligament. The pedicle connects the tumor with the uterus, and is made up, as in the ovarian cyst, of broad ligament, oviduct, ovarian ligament, and ovarian vessels. About 5 per cent. of all ovarian tumors are solid.

Fibromata are histologically identical with fibrous tumors in other organs. They are of rare occurrence, seldom grow to large size, and are usually pedunculated.

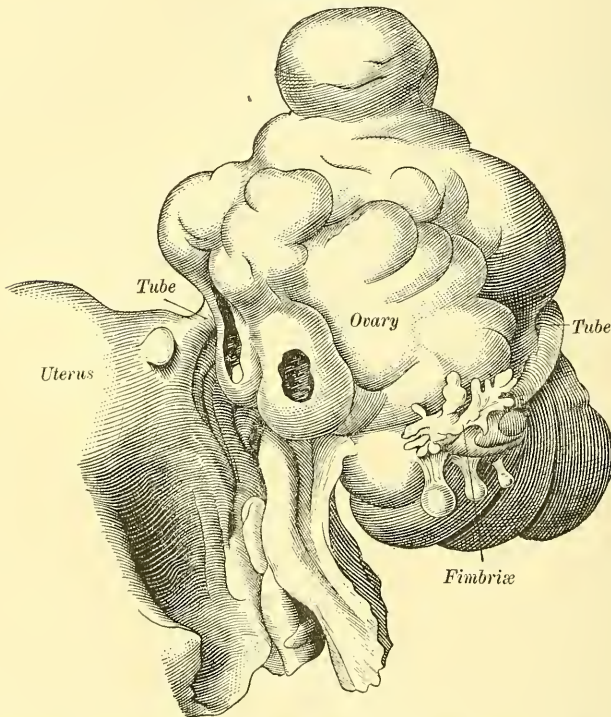
Myomata are rare, though not so rare as fibromata. They are

<sup>1</sup> Sanger, from Pozzi. Gynecology, 2d ed., p. 352.

composed of the usual unstriped muscle fibre and fibrous tissue—fibromyoma. The muscle fibre is traceable from the ovary to the ovarian ligament at the point where the ligament penetrates the paroöphoron. The distinction between the myoma and the spindle-cell sarcoma, even with the microscope, is not always easy. These tumors sometimes grow to large size.

Sarcomata are not of frequent occurrence. Both ovaries are usually primarily involved at the same time. They sometimes occur, especially among children, in connection with dermoid cysts, or follow their removal. The spindle-cell is more frequent than the round-cell variety. As in sarcoma elsewhere, rapid growth, speedy degeneration, and metastatic infection of other organs characterize the disease.

FIGURE 207.



Cancer of the ovary, secondary to cancer of the breast. Both sides affected. Nearly natural size.

**Carcinoma.** Little is known of primary carcinoma of the ovary. It usually arises, if at all, in both ovaries at the same time. Secondary carcinoma may occur by extension from neighboring organs or by metastasis.

*The identification* of solid ovarian tumors will usually require the clinical history, conjoined manipulation, exploratory incision, and microscopic examination. The clinical history will often suffice to separate

the malignant from the benign growths. Conjoined examination will outline a tumor in the ovarian region, will show that it is not connected with the uterus, and will determine its size, form, mobility, and consistency. Exploratory incision will further define its physical characteristics and its exact relation to adjacent organs. The diagnosis is concluded by the microscope.

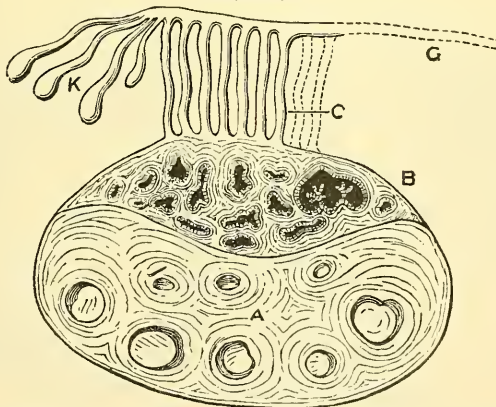
*The Treatment* of benign growths without pressure symptoms or functional disturbance is expectant. That of large benign tumors or of malignant tumors is early removal. The principles of enucleation and ligature of the pedicle are the same as for cystic ovarian tumors. See Ovariectomy.

## CHAPTER XXXII.

### CLASSIFICATION AND PATHOLOGY OF OÖPHOROTIC CYSTS, PAROÖPHOROTIC CYSTS, PAROVARIAN CYSTS, AND OVARIAN HYDROCELE.<sup>1</sup>

THE ovary consists of: 1. The egg-bearing portion, the oöphoron. This is the parenchymatous zone or cortical part; it is the outer part and contains the Graafian follicles. 2. The paroöphoron; this is the

FIGURE 208.



Showing cyst-producing region of the ovary and its surroundings. A. Oöphoron. B. Paroöphoron. C. Parovarium. K. Kobelt's tubes. G. Gärtner's duct.<sup>2</sup>

inner part of the organ, is in relation with the hilum of the ovary, and is sometimes called the vascular or medullary zone; it is composed of fibrous tissue traversed by numerous bloodvessels and never contains

<sup>1</sup> The classification and pathology of ovarian and parovarian cysts follows mainly that of Bland Sutton, and is to some extent an adaptation from his work, *Surgical Diseases of the Ovaries and Fallopian Tubes*.

<sup>2</sup> From Bland Sutton. *Surgical Diseases of the Ovaries and Fallopian Tubes*.



follicles or ova. The paroöphoron is not to be confounded with certain extra-ovarian tubules, called the parovarium. Ovarian cysts may now be classified, according to the cyst-producing region of the ovary in which they spring, into two divisions: A. Those which develop from the oöphoron—oöphorotic cysts. B. Those which develop from the paroöphoron—paroöphorotic cysts. Parovarian cysts, which develop not from the ovary but from the parovarium, being extra-ovarian, will be considered by themselves.

### OÖPHOROTIC CYSTS.

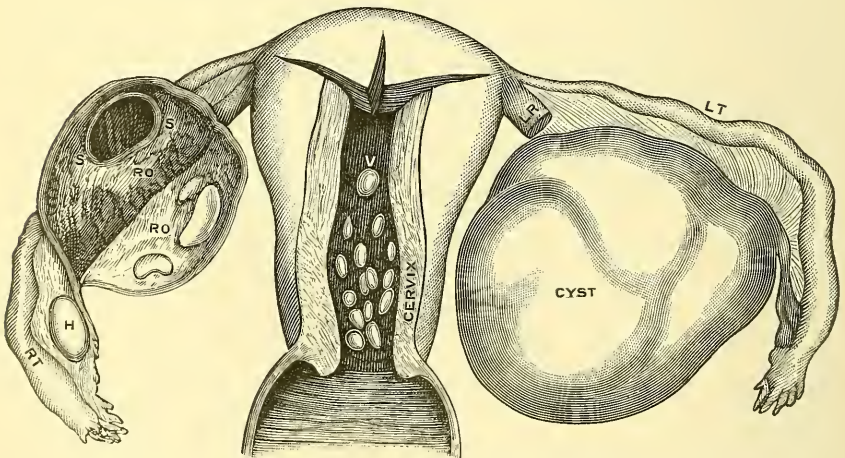
There are various theories of the development of oöphorotic cysts, many of them complex, confusing, vague, and not proven. We have the highest authority for the assertion that they spring from the Graafian follicles. It is at least proven that these follicles largely enter into their development. The subject will be treated from the standpoint of their follicular origin.

Cysts of the oöphoron may be clinically divided into: 1. Unilocular cysts. 2. Multilocular cysts.

#### Unilocular Oöphorotic Cysts.

Unilocular oöphorotic cysts, sometimes called monocysts, are, strictly speaking, rare. These cysts in their inception are enlarged Graafian

FIGURE 209.



Incipient oöphorotic cyst in right ovary. Unilocular oöphorotic cyst in left ovary. Adenoma of the endometrium. LT. Left tube. RT. Right tube.<sup>1</sup>

follicles, and when small their walls are lined with typical membrana granulosa. Almost all tumors classed as monocysts may apparently have a single cavity, but close examination will usually show numerous

<sup>1</sup> After Beigel.

small loculi in their walls. Sometimes, as stated by Sutton, imperfect septa or bands running from one part of the cyst-wall to another show that the cyst was originally multilocular. Parovarian cysts, which are usually unilocular, have often been mistaken for unilocular ovarian cysts; hence the possible impression that the latter are quite common.

The cyst-wall is thin and composed of three layers: the outer layer of endothelial cells, or occasionally, on small growths, cuboidal epithelium; the middle layer of white fibrous tissue; bloodvessels and lymphatics are found in this layer; the inner layer, or lining of *membrana granulosa* like that of the Graafian follicles. This is maintained until the cyst reaches the approximate size of an egg. In tumors the size of an orange the lining layer changes to flat, stratified epithelium. In large cysts of one or more gallons the epithelium disappears by atrophy and gives way to fibrous tissue. The atrophic process is due to the pressure of the fluid contents. The pedicle, which connects not only these but other pedunculated ovarian cysts with the uterus, is made up of broad ligament, round ligament, oviduct, and ovarian bloodvessels.

The fluid contents of some unilocular cysts are identical with mucus. This doubtless comes from their lining of columnar epithelium, which dips down below the surface as in muciparous glands.

In some oöphorotic cysts the walls are lined with skin supplied with an outgrowth of hair, sebaceous and sweat glands, teeth, and other dermal appendages; these are dermoid cysts.

Unilocular oöphorotic cysts vary in size from the capacity of a single follicle to that of several gallons.

#### Multilocular Oöphorotic Cysts.

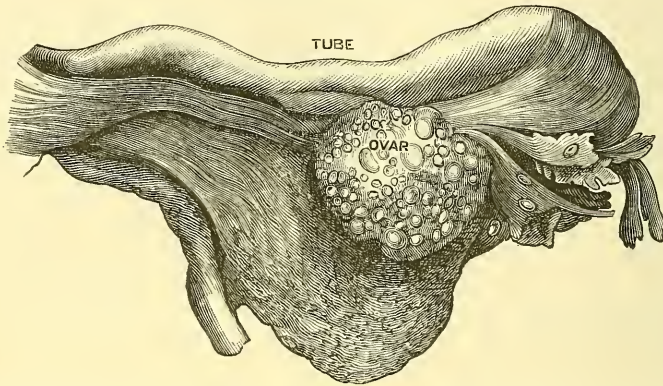
These tumors, sometimes called polycysts, are probably identical in their mode of development with the unilocular variety just described—*i. e.*, they apparently develop from the Graafian follicles.

There may be the simple distention, by their own secretions, of an aggregation of Graafian follicles which have failed to rupture and discharge their contents. The failure to rupture may be due to a thickening and toughening of the walls of the sac. The follicles may then remain simple, small retention cysts, and as such have little or no clinical or surgical significance. This may be true of one or of many follicles; on the other hand, they may take on new growth and develop into palpable ovarian cysts. Figure 210 shows the honeycombed arrangement of the small multiple cysts. This simple cystic development may increase until the tumor becomes enormous, a burden to the patient and a destroyer of life. With increasing size, as in the unilocular variety, the cells of epithelium lining the various compartments become flattened, and may finally disappear by pressure. The cyst-wall has the same structure as that of monocysts.

In many cases the germinal epithelium of the Graafian follicles goes to form glandular structures, and the tumor becomes a so-called glandular cyst or an adenoma. Adenoma will be recognized as one of the most common forms of ovarian cyst. It often grows to enormous size. The whole is made up of numerous small cysts or loculi; they vary in

size from the capacity of a drachm to a quart or more of fluid. Sutton recognizes three varieties of loculi: 1. The large primary cavities. 2. A honeycomb-like mass of cavities which develop in the wall of the primary cyst and project into it. This mass is made up of secondary cysts; they are mucous retention cysts. 3. Small-sized cavities without honeycomb arrangements which have the histological characteristics of distended ovarian follicles. The relation of the primary and secondary cysts to each other is shown in Figure 211. Ovarian adenoma has a strong tendency to become malignant; hence the importance of its early removal.

FIGURE 210.



Microcystic degeneration of ovary.<sup>1</sup> Such small cysts may take on excessive growth or may remain as here represented.

In these cysts are often found dermoid elements in small or large quantities, such as hair, mucous membrane, skin, sebaceous and sweat glands, unstriated muscular fibre, fat, and teeth. A single tumor may have some cysts containing dermoid elements, others containing mucus, and others which are like distended Graafian follicles.

The adenomatous cyst often shades into the dermoid cyst by a gradation which, from the clinical stand-point, is almost imperceptible; the dividing line, therefore, between the adenomatous and the dermoid varieties of oöphorotic cysts is arbitrary and impossible to define. The great clinical importance, however, of dermoid cysts calls for special description.

*Oöphorotic Dermoid Cysts.* The dermoid may be defined as a cyst containing skin or mucous membrane. Some cysts contain both; they are found not only in the ovary, but in various other parts of the body. The quantity of dermoid elements is variable. The skin or mucous membrane may line the entire cyst or may be discernible only over small isolated areas. When the dermoid elements are contained only in a single small compartment of a large multilocular cyst the dermoid character of the growth is apt to be overlooked.

Oöphorotic dermoids may contain any or all of the following struct-

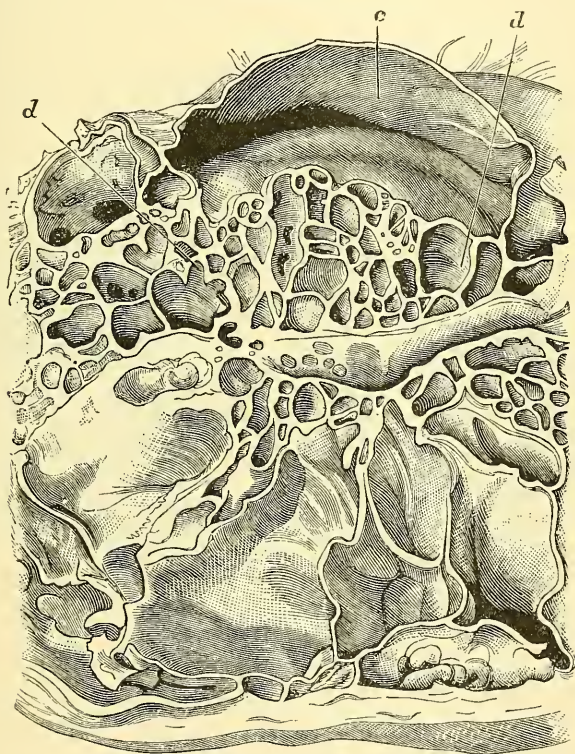
<sup>1</sup> After Beigel.



ures and their products : Skin, mucous membrane, sebaceous glands, sweat glands, hair, teeth, mammæ, nail, horn, bone, unstriped muscle, fat, and brain-like matter. Figure 212 illustrates some of the peculiarities of these extraordinary growths.

The hair sometimes is present in great abundance, and may be matted together in the form of a round ball the size of an orange. The color, according to Sutton, is variable, but does not usually correspond with that on the individual's head. In aged people it may be gray, and may have been shed, leaving the cyst-lining bald.

FIGURE 211.



Portion of an ovarian adenoma, showing the varieties of loculi. *c.* Primary. *d.* Secondary.<sup>1</sup>

Extensive involvement of both ovaries in dermoid cystic disease, even though little normal ovarian tissue remains, does not necessarily render the woman sterile. In one case the patient, at the age of thirty-nine, had had twelve children, the last three months old, at the time of the removal of two dermoid ovaries.<sup>2</sup>

Dermoid tumors occur at all ages, from infancy to extreme senility. They are occasionally found in children and are not uncommon in

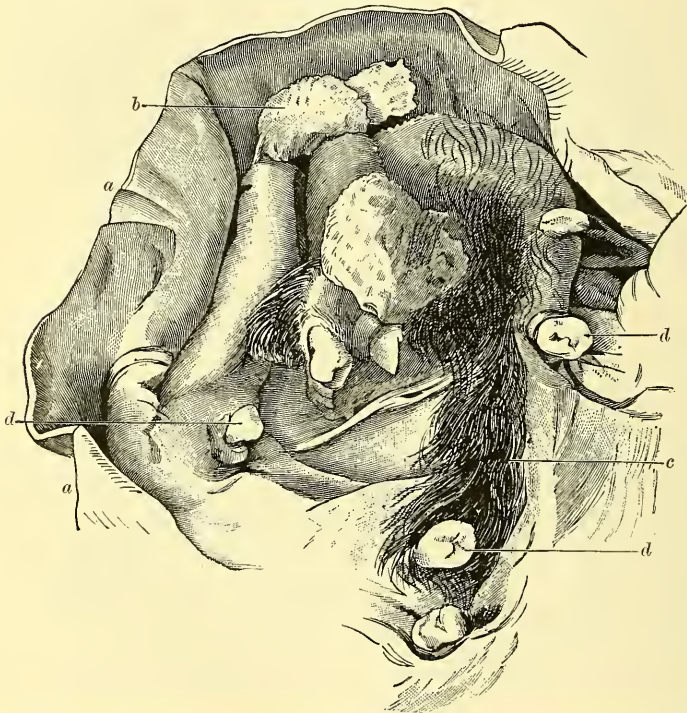
<sup>1</sup> Bland Sutton. *Surgical Diseases of the Ovaries and Fallopian Tubes.*

<sup>2</sup> "Cullenworth." Bland Sutton. *Surgical Diseases of the Ovaries and Fallopian Tubes*, p. 67.

young women. Unlike other forms of ovarian cysts which destroy life in three or four years, dermoids may exist for a lifetime and give little or no inconvenience. They have been found post mortem in aged women who may have had them from the period of sexual maturity and have never been aware of their presence. Like other cysts, however, they may at any time undergo suppuration and other secondary changes, and therefore become dangerous. Although usually classed as innocent tumors, they occasionally give rise, especially in childhood, to malignant degeneration.

The fluid-contents of a pronounced dermoid cyst is an oily fat; at the temperature of the body it is liquid, but at a lower temperature semi-solid.

FIGURE 212.



Portion of wall of ovarian dermoid cyst. *a.* Wall. *b.* Elevations composed of fatty and cutaneous tissue. *c.* Hair. *d.* Teeth.<sup>1</sup>

*The Natural Fluid-contents of an Ordinary Oöphorotic Cyst* is usually transparent, clear, and of light straw-color, and of a specific gravity from 1010 to 1050. In the progress of the disease secondary changes occur which make the widest variation in its physical properties. This variation is caused by the admixture of blood, pus, fat, epithelial cells, cholesterin, and by chemical changes. The fluid therefore may be thick, thin, dark, light, clear, muddy, chocolate colored. The fluid of

<sup>1</sup> From Ziegler, in American System of Gynecology.

paroöphorotic cysts, about to be described, is apt to remain clear, thin, and light colored. Its chemical properties and microscopical appearance are much the same as those of oöphorotic cysts.

### PAROÖPHOROTIC CYSTS.

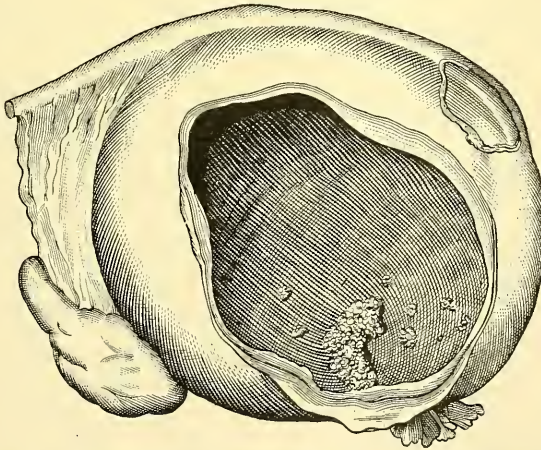
**Pathology.** These cysts develop in the paroöphoron. See page 357. They are not to be confounded with an entirely different tumor, the parovarian cyst, which develops from the parovarium. Cysts which spring from the paroöphoron have the following characteristics:

1. They are rare before the twenty-fifth year, more common between the ages of thirty and fifty, seldom grow to the large size of the oöphorotic cysts, and are usually unilocular.

2. They commonly develop between the layers of the mesosalpinx, and finally, with increased growth, separate the layers of the broad ligament and force their way between them to the lateral walls of the uterus, and often, therefore, feel, on digital touch, as if they were an outgrowth from the uterus.

3. They contain in variable quantity warty or papillomatous growths; hence the name papillomatous cysts. It should be noted in this connection that other papillomatous cysts are found in the ovary and broad ligaments which have not developed from the paroöphoron.

FIGURE 213.



Paroöphorotic cyst. Its relations to the tube, ovary, and mesosalpinx are well shown. A warty development is shown inside the cyst cavity.<sup>1</sup>

The cyst-wall is composed of the usual fibrous tissue and of an inner lining of cylindrical epithelium. The source of this epithelium is not definitely known. It is thought to be from remnants of epithelium from the Wolffian body.<sup>2</sup>

<sup>1</sup> Doran. Transactions Pathological Society, London, vol. xxxii.

<sup>2</sup> *Ibid.*



The chief characteristic of these cysts is the papillomatous or warty growth which they contain. The warty masses proliferate rapidly, bleed freely on manipulation, are soft and friable, vary in quantity from that of the smallest wart to that of an orange, may be either sessile or pedunculated, and, according to the variable blood-supply, may be pale or pink. These papillomatous elements may so increase in quantity as to force their way by rupture or perforation through the cyst-walls, spread over the outside, and infect the adjacent peritoneum. They sometimes undergo calcification. Warty ovarian cysts may be associated with dermoids, and occasionally with sarcoma of the ovary. Tapping is contraindicated, for if fluid escapes into the abdominal cavity the peritoneum may become infected; hence in their removal care should be used against the escape of fluid.

Other papillomatous cysts which, according to Bland Sutton, do not spring from the paroöphoron, differ, he says, as follows from the warty paroöphorotic cysts just described:

1. They may be in any part of the ovary.
2. They are usually multiple.
3. The warts are of almost cartilaginous hardness.
4. They are not known to grow to such size as would make them dangerous to life.
5. They are frequently associated with uterine myomata.
6. They are apt to spring from the neighborhood of the parovarium and to burrow between the layers of the mesosalpinx, quite away from the parovarium.

#### PAROVARIAN CYSTS.

The parovarium from which these tumors spring is the remnant of the Wolffian body. It has no known physiological significance. The epididymis and vasa efferentia in the male also spring from the Wolffian body and are the homologue of the parovarium. If the broad ligament is stretched and held up to the light a series of small tubules will be seen radiating from the ovary and joining at right angles a longitudinal tubule. The tubules are the parovarium. See Figure 208. They are of three kinds: 1. The vertical tubules. 2. The outer tubules, free at one end—Kobelt's tubes. 3. The longitudinal tube—Gärtner's duct. This duct is the homologue of the vas deferens in the male; it may occasionally be traced downward to the vagina. The parovarium lies between the folds of the mesosalpinx.

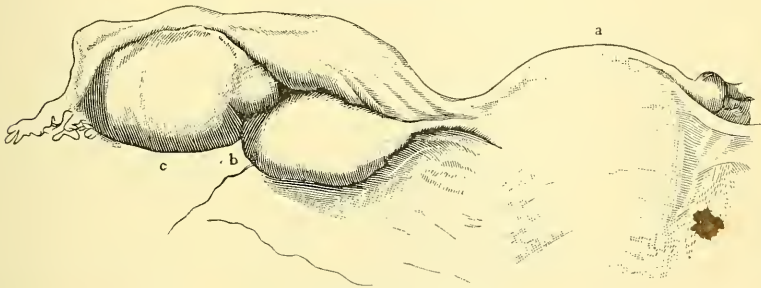
The little tubules of Kobelt are very often distended by their fluid contents into small cysts, usually not larger than a pea. These cysts, which have little or no significance, are frequently confounded with the hydatid of Morgagni. A distended vertical tubule may become separated and form a pedunculated cyst. This may rupture, discharge its contents into the abdominal cavity, and become obliterated. The remnant of the cyst-wall then presents a fringe-like appearance.

The usual parovarian cyst springs from a single vertical tubule. When the tumor develops from a single tubule it is monocystic. Most

commonly it develops and remains between the layers of the mesosalpinx. As it grows larger it forces its way between the layers of the mesometrium—that is, the broad ligament—and lies in close relation with the uterus. The Fallopian tube, with its fimbriated extremity attached to the ovary and its uterine end to the uterus, is stretched over the enlarging cyst-wall. The tube in this way is often enormously elongated; its lumen usually remains open. The fimbriæ are easily recognized.

The walls of small cysts are usually quite thin and transparent; when larger they become thick, opaque, pearly-like, and of conjunctival blue color. The lining of the small cysts preserves the columnar epithelium of the tubule; in larger cysts the epithelium becomes flattened; in the largest cysts the atrophic influence of pressure is so great as entirely to destroy the epithelium.

FIGURE 214.



Small parovarian cyst. a. Uterus. b. Ovary. c. Tumor.<sup>1</sup> Showing the relations of the ovary and Fallopian tubes to the cyst.

Unlike the ovarian cyst, which is a diseased ovary, the parovarian cyst usually has a normal ovary attached to its side. The fluid is almost always clear and colorless, like spring-water, and on the nitric-acid and heat test shows albumin. Its specific gravity is usually much less than 1010. The reaction is faintly acid. See Tabular Diagnosis between Parovarian and Ovarian Cysts, in the next chapter. Adhesions rarely form about these cysts. The peritoneal covering is easily stripped off.

The parovarium does not take on demonstrable cystic disease before the age of puberty. The more common age for the development of this form of cyst is from eighteen to thirty-five.

*Cysts of the Broad Ligament.* This name is reserved by many to designate parovarian cysts. Several other different cysts, however, also develop in the broad ligament. The name, therefore, has no definite significance beyond the fact that it designates a cyst which is situated between the layers of the ligament. Such a cyst may originate in the ovary and gradually force its way between the folds of the broad ligament. It not uncommonly originates in the paroöphoron near the hilum of the

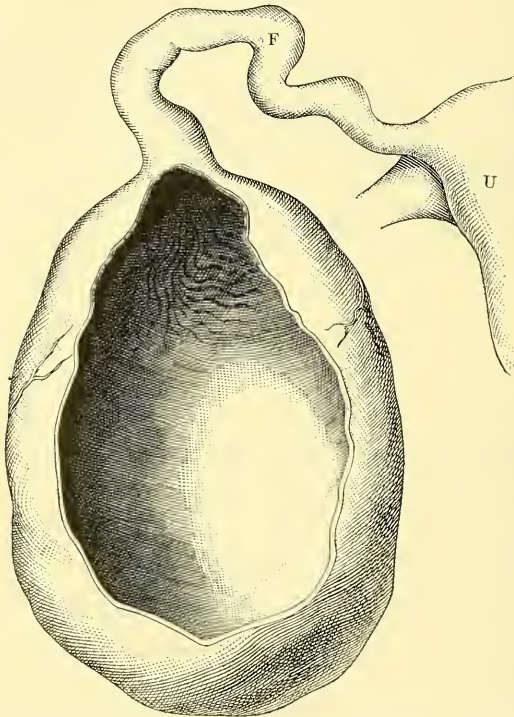
<sup>1</sup> After Bantock, in American System of Gynecology.

ovary. The great majority of broad ligament cysts are either paro-  
phorotic or parovarian. When they are of ovarian origin they are  
usually called intraligamentous ovarian cysts.

### OVARIAN HYDROCELE.

In this rare and curious disease the dilated Fallopian tube commu-  
nicates by its abdominal opening with the cavity of a cyst. The open-  
ing is usually large and circular. According to Bland Sutton,<sup>1</sup> the  
formation of the cyst is analogous to that of hydrocele in the male.  
He gives evidence to show that it arises in a tunic of peritoneum, which  
sometimes invests the ovary as the tunica vaginalis covers the testis.

FIGURE 215.



Ovarian hydrocele. Natural size. F. Fallopian tube. U. Uterus.<sup>2</sup>

Ovarian hydrocele has hitherto been confounded with tubo-ovarian  
cyst. The distinctions between the two cysts are shown on the next  
page.

Ovarian hydrocele may suppurate, and may then easily be confounded  
with a tubo-ovarian abscess. The treatment is ovariectomy.

<sup>1</sup> Surgical Diseases of the Ovaries and Fallopian Tubes, p. 111.

<sup>2</sup> Bland Sutton. Surgical Diseases of the Ovaries and Fallopian Tubes, p. 112.



## OVARIAN HYDROCELE.

1. Salpingitis has nothing to do with the cause, although it may be present as a complication.
2. The opening between the tube and sac is large and round or oval, and is the dilated abdominal opening of the tube.
3. The tube is usually tortuous, like the worm of a retort.
4. There is apt to be an intermitting discharge of fluid from the tube through the uterus—*hydrops tubæ profluens*.

## TUBO-OVARIAN CYST.

1. Salpingitis is a cause of the communication between the tube and ovarian cyst. See page 231.
2. The opening is variable in size, and usually does not correspond to the abdominal ostium; if the cyst is purulent—*i. e.*, if it is a tubo-ovarian abscess the opening is usually very small.
3. The tube is usually larger and not so tortuous.
4. The intermitting discharge—*salpingitis profluens*—not common.

## CHAPTER XXXIII.

SECONDARY CHANGES—DIAGNOSIS AND DIFFERENTIAL  
DIAGNOSIS OF OVARIAN AND PAROVARIAN CYSTS.

## SECONDARY CHANGES.

THE principal secondary changes in ovarian and parovarian cysts are: 1. Infection. 2. Twisting of the pedicle. 3. Rupture of the cyst.

## 1. Infection.

The sources of infection from which bacteria may reach the cyst are the adjacent organs, *viz.*, the adherent Fallopian tube, urinary bladder, and intestine. Formerly, when tapping and aspiration were frequent and asepsis was disregarded, infection was frequently introduced by the puncture. Small cysts which remain fixed in the pelvis in close relations with the pelvic viscera are more subject to inflammation than the large growths which fill the abdomen. When adhesions occur in large cysts they are usually stronger and more extensive in the pelvis than in the abdomen.

The Fallopian tube is doubtless the greatest carrier of infection. This may be inferred from the fact that when an infected cyst becomes adherent to adjacent organs the strongest adhesions are usually where the poison, if it came through the tube, would first reach the cyst, *viz.*, about the abdominal end of the tube. This inference is strengthened by the almost constant presence of salpingitis in connection with infection of the cyst-wall. Inflammation and consequent adhesions from this source are not, however, confined to the neighborhood of the tube; they may extend indefinitely over the tumor, gluing it to any adjacent peritoneal surface, visceral or parietal, and the infection may even penetrate the cyst-wall.

The intestine and bladder, if inflamed, are prolific sources of infection. The inflamed gut readily adheres to the cyst-wall, and becomes softened by the inflammatory process or thin from the atrophic results of pressure. Germ-bearing gases may, according to Sutton, pass into the cyst and set up suppurative inflammation of the sac, or the adherent gut and sac-walls may become perforated; the sac-contents will then escape by way of the bowel. Extensive infection of a cyst is not infrequently traceable to an inflamed adherent vermiform appendix.

*Suppuration.* Inflammation of the cyst often goes on to suppuration and to the formation of the most extensive adhesions. In acute suppuration the symptoms rapidly become grave; they are: 1. Sudden enlargement of the tumor. 2. Severe pain and tenderness. 3. Rapid and weak pulse. 4. High temperature and exhaustion. Acute nephritis, with albuminuria, is a frequent complication. In some cases putrefaction leads to the formation of gases in the cyst. A tympanitic percussion note then takes the place of the tumor dulness. In rare cases rupture of the sac and the discharge of its purulent contents through the intestine or some other viscus may avert the otherwise fatal result. Usually the only hope lies in prompt ovariectomy.

*Adhesions* are among the most constant results of inflammation. Formerly they were the *bête noir* of the surgeon. Now, with improved technique, tumors which would formerly have been abandoned with an exploratory incision are almost always removed. Adhesions may be abdominal or pelvic, visceral or parietal. Visceral adhesions are those which unite the tumor to the uterus, bladder, liver, and other abdominal or pelvic viscera. Adhesions to the omentum are common and often extensive. Intestinal adhesions sometimes give rise to dangerous, even fatal, obstruction of the bowel. Pelvic adhesions are more inaccessible, and therefore more dreaded than the parietal. Two large ovarian cysts, one from the right and the other from the left ovary, may come in contact with each other and become strongly and broadly united. The difficulties of diagnosis and operative removal are then much increased.

## 2. Twisting of the Pedicle.

Rotation of the cyst with consequent twisting of the pedicle is an occasional and serious accident.

*Acute Torsion* is a sudden rotation of the cyst with sufficient twisting of the pedicle to set up grave symptoms.

*Chronic Torsion* is a slow rotation of the cyst, with gradual twisting of the pedicle. This gives the tumor an opportunity to readjust itself to the changed conditions. The symptoms are less severe and the course more prolonged than in acute torsion. The impaired circulation may be partially restored through adhesions. The pedicle in rare cases is completely twisted off. The detached tumor must then receive its blood-supply, if at all, by way of vessels which reach it only through adhesions.

The Causes to which this occurrence has been attributed include alternate distention and evacuation of the bladder and bowel, a fall,

violent exertion, and tight lacing. Rotation occurs most frequently when the tumor is complicated by pregnancy and when both ovaries are cystic, especially when there are two cysts of considerable size.

**Pathological Results and Symptoms.** The circulation to and from the tumor passes through the pedicle; hence torsion of the pedicle must obstruct that circulation. This obstruction will pertain more to the easily compressible veins than to the more resistant arteries. Blood may, therefore, flow in through the arteries after the return venous circulation has been obstructed. This, in proportion to the degree of torsion, will set up congestion. There may be only a slight tumefaction of the cyst-wall, perhaps occasional extravasations of blood from small vessels. In severe cases the venous engorgement may be so intense as to cause rupture of the larger vessels, rapid and great distention of the sac from profuse hemorrhage, rupture of its walls, and the discharge of its contents into the abdomen. The hemorrhage may be rapidly fatal.

The twisting of the pedicle of a small cyst may, by cutting off the circulation, cause it to atrophy and practically to disappear. The atrophied cyst may have even become detached from the pedicle and remain free in the abdomen. This fortunate result would clearly be possible only under conditions of absolute freedom from infection. As already explained, infection may reach the cyst from various sources. Rotation, if sufficiently acute to cut off the venous circulation, would result in gangrene of the cyst, and, unless ovariectomy were speedily made, infection and death would ordinarily follow.

The Treatment of both acute and chronic torsion is ovariectomy.

### 3. Rupture of the Cyst.

The cyst may rupture into the abdominal cavity, into any part of the alimentary canal, or into the bladder. One locument of a multilocular cyst may rupture into another. Very commonly thin-walled secondary locuments rupture into the abdominal cavity, leaving the remaining compartments of the cyst intact. The opening made by the rupture may reunite and the cyst refill.

**Causes.** Rupture from direct injury may be due to a blow, a fall, violent examination by the surgeon, sudden movement of the patient, or to powerful contraction of the abdominal muscles in parturition. Spontaneous rupture is often caused by overdistention of the sac. This is specially liable to occur when the cyst-wall, or any part of it, from inflammation, distention, or other cause, is thin or degenerated. Torsion of the pedicle as a cause of rupture has been noted in a foregoing paragraphs.

**Results.** A ruptured parovarian cyst may become obliterated and thereby spontaneously cured. Cases of supposed ovarian cysts have repeatedly been reported as cured by tapping. It is known that an ovarian cyst cannot be cured in this way. The tumors in question must therefore have been parovarian. The former practice of tapping ovarian cysts, as a means of radical cure, has therefore been abandoned. Even parovarian cysts are better treated by removal.



The contents of a parovarian cyst is usually mild and innocent. Rupture of the sac and the discharge of its contents into the abdomen are therefore harmless. The fluid is quickly taken up and eliminated by the kidneys. If the fluid of a cyst pass by rupture into the stomach, intestines, or bladder, the opening may close and the sac refill, or the opening may remain and transmit the contents of the viscus to the sac. In this way an ovarian cyst may be filled with feces and gas from the bowel. The tumor-dulness is then replaced by resonance on percussion.

If the sac ruptures and sends its fluid into the peritoneal cavity the results are immediately more serious. The accident is usually marked by sudden pain. A monocyst will discharge its whole contents and collapse. A polycyst, upon rupture of one or more of its locuments, only changes its shape. The escaped fluid is usually eliminated by immediate, profuse diuresis. The sac may gradually refill. The gravity of the case will depend upon the nature of the fluid; if the fluid is bland, like that of a parovarian cyst, the condition is not grave; if irritating, like that of most ovarian cysts, there will usually be more or less severe peritonitis with adhesions; if infectious, as in an inflamed cyst, the result may be fatal peritonitis. Such a case would demand immediate ovariectomy.

The malignant degenerative changes have been mentioned in a former chapter, and are not very uncommon.

### SYMPTOMATOLOGY.

There are no pathognomonic signs of ovarian disease. The symptoms of ovarian and parovarian tumors involve a consideration of the following topics:

1. Secondary changes.
2. Pressure.
3. The facies ovariana.

1. **The Symptoms due to Secondary Changes.** Inflammation, twisting of the pedicle, and rupture of the cyst have been outlined in the foregoing chapter.

2. **The Pressure Symptoms.** Tumors which fill the small pelvis may, by pressure upon the rectum and bladder, give rise to obstruction, tenesmus, hemorrhoids, cystitis, frequent urination, and dysuria. Pressure upon the iliac veins causes œdema of the vulva and lower extremities. Ascites may result from pressure on the vena cava or from malignancy. Both large and small cysts displace the uterus forward, backward, or to one side. Large cysts which have risen out of the pelvis into the abdominal cavity may cause little or no disturbance, or by pressure upon the abdominal and thoracic viscera may set up the most distressing symptoms. Among these symptoms are, weakness of the heart, rapid pulse, and dyspnoea from upward pressure on the diaphragm; nausea, vomiting, and other functional disturbances in the alimentary tract from pressure on the stomach and bowels; catarrhal jaundice from portal congestion, and pressure on the liver and bile-ducts. The breathing may be so difficult that the patient must continuously maintain, night and day, the sitting posture.

3. **The Facies Ovariana.** This is a peculiar facial expression which is highly diagnostic of the disease in its later stages. It is difficult to describe, but once seen is easily remembered. The natural facial expression is modified as follows :

1. The face is shrivelled, elongated, and has an anxious and careworn expression.

2. The nostrils are wide, the angles of the nose and mouth are drawn down, and the lips are thin.

3. The cheeks are furrowed and the face is marked by deep wrinkles.

4. The space between the eyelids and the bony margin of the orbits is sunken and hollow.

5. The whole areolar tissue of the face is atrophied.

6. The face is pale, but not with that peculiar leaden, sallow, or parchment-like color seen in malignant diseases.<sup>1</sup>

FIGURE 216.

The facies ovariana.<sup>2</sup>

*The facies ovariana* is quite in contrast with an indescribable and less marked facial expression known as the *facies uterina*. This is often present in pregnancy and sometimes in cases of uterine tumors. The face is full and flushed.

#### DIAGNOSIS.

The recognition of a large, uncomplicated ovarian cyst is usually not difficult. The means of diagnosis are these :<sup>3</sup>

1. Clinical history.
2. Inspection.

<sup>1</sup> Adaptation from Peaslee's Ovarian Tumors.

<sup>2</sup> Peaslee's Ovarian Tumors.

<sup>3</sup> In the diagnosis and differential diagnosis I have made numerous adaptations from the classical work on ovarian tumors by my honored friend and teacher, the late Dr. Edmund Randolph Peaslee.

3. Palpation.
4. Percussion.
5. Conjoined examination.
6. Measurement.
7. Aspiration or tapping.
8. Exploratory incision.

The physical examination by inspection, palpation, percussion, or conjoined manipulation requires that the abdomen be exposed and that the patient lie on a hard couch or table, preferably the latter.

1. The Clinical History should include a consideration of the secondary changes as outlined on page 367. It also includes the symptoms noted in the foregoing paragraphs, the age, social condition, pregnancies, if any, family history, and menstrual history.

2. Inspection. If the tumor is small, the enlargement will be most apparent on the affected side; as it grows larger and rises out of the pelvis the swelling will be greater in the lower part of the abdomen between the pubes and the umbilicus, and will be nearer the median line. Abdominal enlargement from a unilocular cyst is obviously more symmetrical than from a multilocular cyst. With declining strength the *facies ovariana* becomes more pronounced.

3. Palpation will show an elastic, fluctuating tumor: if small, in the pelvis; if large, extending into the abdomen. The mass will be more distinct on the affected side. Its relative position will not change with change in the position of the patient. The degree and character of elasticity will vary with the tenseness of the cyst and the consistency of its contents. A greatly distended tense sac, especially if the contents are semi-solid, may feel like a solid tumor.

Although it is rare to find solid matter predominating in the ovarian cyst, large masses of apparently solid matter and smaller nodules of very hard or bone-like substance are often present and detected by palpation. The more solid parts are found rather in the pelvis than in the abdomen. The different locuments of a multilocular cyst are in some cases easily outlined by palpation. The cyst may sometimes be moved from side to side, up and down; the degree of mobility will depend upon its size, the length of the pedicle, and the extent of the adhesions. In cases of very thick or rigid abdominal walls, and especially of small tumors, *anæsthesia* facilitates the examination.

4. Percussion. The tumor sac, with its contents, occupies the anterior part of the abdomen; the intestines are in the posterior, lateral, and upper parts; hence the maximum dulness on percussion will be over the anterior and lower portions of the abdomen. Since the cyst extends from the pelvis, dulness will be continuous from the abdomen into the pelvis; it will, however, cease abruptly or shade off into resonance and tympanites at the limits of the tumor, toward the sides of the abdomen and toward the diaphragm. This is because the space above and to the sides of the tumor is filled with intestines. For the relative areas of dulness and resonance, see Differential Diagnosis of Ovarian Cyst and Ascites. The location of the cyst does not change with change in the position of the patient; the areas of dulness correspond to the location of the tumors, and are constant.



The *Percussion Wave* usually present is elicited by placing the finger-tips of the left hand to one side of the tumor and with the finger-tips of the right hand sharply tapping or thumping, or snapping with the thumb and finger, the other side. In very tense cysts and in cysts with semi-solid contents like dermoids, the wave may be absent.

5. **Conjoined Examination**, which includes vaginal and rectal touch, will usually show the relations of the uterus to the cyst. The importance of this means of diagnosis is great, for any cyst of pelvic origin not connected with the uterus is almost certainly ovarian or parovarian. If, therefore, upon vaginal or rectal touch, the uterus proves to be healthy and normally mobile, with little or no increase in the length of its cavity, the presumption is in favor of an ovarian tumor; if, upon conjoined examination with one or two fingers of the left hand in the vagina or rectum, and the right hand over the abdomen, the uterus can be made out as distinct and separate from the cyst, the proof of an ovarian tumor is almost complete.

In very exceptional cases of ovarian cyst, however, the uterus may be enlarged, drawn up out of the true pelvis, immobile, and otherwise abnormal. The cyst may be so moulded to the pelvis as to press the uterus forward and upward and flatten it against the pubes. The tumor and the uterus may, through adhesions or location, be really or quite inseparable from each other; such conditions are very indicative of uterine tumors, but are occasionally found with ovarian cysts. See *Differential Diagnosis of Ovarian Cysts and Uterine Tumors*.

6. **Measurements**. The circular measurement of the abdomen is increased. The distance from the anterior superior process of the ilium to the umbilicus is greater on the affected side. The distance from the pubes to the umbilicus is relatively more increased than that from the umbilicus to the ensiform cartilage.

7. **Aspiration or Tapping**, once a common means of diagnosis, is now almost abandoned. This is because there is always some danger from the possible escape of fluid into the abdominal cavity; also because the diagnosis can usually be made without tapping, and because an exploratory incision is safer and more effective. The principal object of tapping has been to obtain fluid for chemical and microscopical examination. For the nature of the fluid contents of ovarian cysts see page 362. Tapping or aspiration as a means of diagnosis is unnecessary, dangerous, and therefore obsolete.

8. **Exploratory Incision** is the final resort in diagnosis and differential diagnosis. When this is done the patient should be prepared for ovariectomy, and the tumor, if operable, should be removed.

## DIFFERENTIAL DIAGNOSIS.

This subject involves, first, the differential diagnosis of oöphorotic, paroöphorotic, parovarian, and dermoid cysts from one another; second, the differentiation of ovarian and parovarian cysts from other conditions with which they have been confounded.

## Distinction between Oöphorotic, Paroöphorotic, and Parovarian Cysts.

This distinction has been given under pathological anatomy and secondary changes. The following tabular statement, however, will emphasize the differential points :

OÖPHOROTIC CYSTS.	PAROÖPHOROTIC CYSTS.	PAROVARIAN CYSTS.
1. Develop from the oöphoron.	1. Develop from the paroöphoron.	1. Develop from the parovarium.
2. Almost always multilocular. Apt to contract adhesions.	2. Usually unilocular. Apt to contract adhesions.	2. Almost always unilocular. Do not usually contract adhesions.
3. May attain enormous size ; growth rapid. Never cured by tapping.	3. Usually of moderate size and confined to true pelvis. Never cured by tapping.	3. May become quite large, but not so large as the oöphorotic cysts ; growth slow. Sometimes cured by tapping.
4. Fluid may be thick, thin, muddy, light, dark, or coffee colored, albuminous.	4. Fluid more usually thin and of straw color, albuminous.	4. Fluid usually light like spring water. Specific gravity rarely as high as 1010. May be only slightly albuminous or non-albuminous.
5. Usually pedunculated.	5. May be pedunculated, but more apt to develop between the folds of the broad ligament.	5. Usually not pedunculated. Development in broad ligament is sometimes called broad ligament cyst, because so often in that ligament.
6. Does not often contain warts, <i>i. e.</i> , papillomata.	6. Interior of cyst is beset with warts.	6. Seldom papillomatous.
7. Sac wall does not usually have peritoneal covering.	7. Same.	7. Sac has peritoneal covering from which it may be readily enucleated.
8. Apt to become adenomatous.	8. Apt to become papillomatous.	8. Is neither an adenoma nor a papilloma.
9. Is fatal, in three or four years. Facies ovariana marked.	9. Same.	9. May not impair health for many years. Facies ovariana absent or not marked.

*Dermoid Tumors* develop from the oöphoron, and are therefore oöphorotic cysts. They have been specially described in a former chapter. The diagnostic points by which they may be distinguished from the three kinds of cysts just tabulated are these :

1. Facies ovariana comes very late, if at all.
2. May exist for many years without impairment of the general health.
3. Abdominal enlargement usually to one side, otherwise symmetrical.
4. Do not grow to very large size.
5. The contents too thick to permit tapping even with a large trocar.
6. Inflammation of cyst and adhesions not very uncommon.
7. Spontaneous rupture not common.
8. Edema of lower extremities rare.
9. Fluctuation and percussion wave obscure or absent.
10. Contains dermoid elements.

11. Apt to undergo sarcomatous-like degeneration, especially in children.

**The Differentiation of Ovarian Cysts from Other Conditions which may be Mistaken for Them.**

The pathological conditions that have been mistaken for ovarian cysts may, for convenience of description, be divided into those which originate in the pelvis and those which originate in the abdomen.

INTRAPELVIC CONDITIONS.		ABDOMINAL CONDITIONS.	
Pregnancy	{	Ascites.	
		Hydramnios,	Encysted ascites.
		Tubal pregnancy,	Hydatid cysts.
		Gestation in one horn of a bifurcated uterus.	Renal tumors.
Uterine tumors	{	Floating kidney.	
		Myoma,	Pancreatic cyst.
		Sarcoma,	Enlarged liver.
		Carcinoma,	Mesenteric cyst.
		Metritis,	Cysts of the urachus.
		Hæmatometra,	Enlarged gall-bladder.
		Hydrometra,	Intestinal tumors.
Pyometra,	Fatty tumors.		
Physometra.			
Inflammatory enlargement	{	Parametritis,	
		Pelvic abscess,	
		Soctosalpinx,	
		Peritonitis,	
		Pericæcal abscess.	

One or more of the above conditions may coexist with ovarian cystoma. The diagnosis is then complicated, difficult, and, without exploratory incision, may be impossible. Before taking up the subjects outlined in the foregoing table it is important to consider the following question :

QUESTION I. : Is there any tumor at all within the peritoneal cavity ?

The abdomen has been repeatedly opened for the removal of a supposed ovarian tumor, when no tumor of any kind existed; even more frequently, tapping and aspiration have been done when no fluid was present. One author, in his statistical tables, mentions no less than twenty-one cases of this kind.<sup>1</sup> The following conditions may have the appearance of an intra-abdominal enlargement when no such enlargement exists:

1. Fat in the abdominal walls.
2. Phantom tumor.
3. Tympanites .
4. Fæcal accumulations.
5. Distended bladder.
6. Dilated stomach.

1. Fat in the Abdominal Wall. An eminent British surgeon once laid open the abdomen from the pubes to the ensiform cartilage only to find, instead of an ovarian cyst, a mass of subcutaneous fat. Similar blunders have repeatedly occurred. Such an error at the present day, however, would be almost impossible. No proper signs of ovarian cyst would be present in such a case. The mass of fat in the abdom-

<sup>1</sup> Dr. John Clary, in *Ovarian Tumors*, 1872, Peaslee, p. 123.



inal wall may be grasped between the hands and isolated from the abdomen. Vaginal touch would also yield negative evidence of a tumor. Great thickening of the abdominal wall from œdema is differentiated by pitting on pressure.

2. **Phantom Tumor.** Some hysterical women have the power so to contract the abdominal muscles as to force up the tympanitic intestines into a bunch, and in this way to make an apparent abdominal enlargement in form like that of a tumor. Prolonged firm pressure with the palms of the hands usually overcomes the muscular contraction. The percussion note is decidedly tympanitic. Anæsthesia completely exposes the deception.

3. **Tympanites.** The almost incredible blunder has occasionally been made of mistaking tympanites for an abdominal tumor. This has usually occurred when the evidences of percussion and palpation were obscured by large amounts of abdominal fat. Tympanites will be known by resonance on percussion, absence of the percussion wave, and by the negative results of vaginal touch.

4. **Fæcal accumulations** in the bowel have occasionally led to the suspicion of an ovarian cyst. The history of constipation, supplemented by palpation, will clear the diagnosis; if not, active catharsis will remove all doubt.

5. **Distended Bladder.** Retained urine may accumulate in large quantity until the bladder appears between the pubes and umbilicus as a distinct fluctuating tumor. The external appearance, on inspection, palpation, and percussion, is very like ovarian cystoma. The anterior vaginal wall, however, bulges into the vulvar orifice. There is an almost or quite continuous overflow of urine through the urethra. Hypogastric pain and distress are urgent. The use of the catheter will settle all possible doubt.

6. **Dilated Stomach.** The author personally knows of one case in which a deservedly eminent surgeon opened the abdomen for a supposed ovarian cyst and found instead a dilated stomach. The condition would be distinguished from ovarian cyst by the maximum enlargement above instead of below the umbilicus, and by resonance on percussion all over the tumor. A positive test is to let the patient swallow water while the stethoscope is placed over the tumor. As the water reaches the stomach its gurgling sound will be clearly heard all over the enlargement.

Given sufficient evidence that there is a tumor, the next inquiry is—

QUESTION II. : Is the enlargement of pelvic or of abdominal origin ?

If not of pelvic origin it cannot be ovarian, and therefore does not come within the scope of this inquiry. If the hand cannot be inserted by deep firm pressure between the tumor and the symphysis pubis, it is inferred that the tumor rises from the pelvis; if the vaginal and rectal touch confirm this inference, it is so decided.<sup>1</sup> The pelvic origin of the tumor being established, the next inquiry is—

QUESTION III. : Is the tumor possibly due to pregnancy ?

The humiliation of attempting to remove from a pregnant woman an ovarian tumor which does not exist may be avoided by assuming,

<sup>1</sup> Adaptation from Peaslee's *Ovarian Tumors*, p. 136.

until the contrary is proved, that every abdominal enlargement is due to pregnancy.

### Differential Diagnosis of Normal Gestation and Ovarian Cyst.<sup>1</sup>

NORMAL GESTATION.	OVARIAN CYST.
1. Enlargement sudden, rapid, and usually symmetrical.	1. Enlargement gradual and, until tumor becomes large, asymmetrical.
2. Facies natural and healthy.	2. Facies ovariana. Page 371.
3. Superficial veins of abdomen not enlarged. Œdema of ankles not uncommon after seven months.	3. Veins enlarged. Œdema exceptional and only after one or two years.
4. Fluctuation not distinct unless liquor amnii is excessive.	4. Usually very distinct, especially in mono-cysts.
5. Menstruation arrested.	5. Not usually arrested unless late in the disease.
6. Vaginal touch detects softening and apparent shortening of the cervix and enlargement of the uterus. No extra-uterine tumor.	6. Uterus unchanged except by displacement, usually in front of or behind the cyst. Tumor extra-uterine.
7. Balottement gives impulse of fœtus.	7. Balottement gives negative results.
8. Fœtal heart-sounds about twentieth week.	8. None.
9. Fœtal movements about sixteenth week.	9. None.
10. Enlargements and areola about nipples darkened.	10. Rarely imitated.
11. Tumor has developed in six to nine months.	11. Development continues one to three years.

If the fœtus is dead the heart-sounds and foetal movements will not be present.

Ovarian cyst and pregnancy not infrequently coexist. The diagnosis is then made by the clinical history of both conditions, by palpation, and by conjoined examination.

*Hydramnios* is an excess of amniotic fluid. There is normally from six to thirty ounces; this amount may be increased enormously, giving the uterus the appearance of an immense cyst. The attempt has occasionally been made to tap or remove such a tumor by mistake for an ovarian cyst.

*Tubal Pregnancy.* The diagnosis of this condition will be found in Chapter XXXVI. Unlike ovarian cyst, it gives an early, though irregular, history as of normal pregnancy. Conjoined examination before rupture shows a boggy, fluctuating, pulsating tumor at the side and back of the uterus. After rupture the tumor is less distinct, non-pulsating, and non-fluctuating. At or near the time of rupture the endometrium throws off a modified decidua of pregnancy. The symptoms of rupture are urgent; they are those of pelvic hæmatocele, and are not likely to be mistaken for any symptoms of ovarian cyst unless it be those of rupture of the sac or twisting of the pedicle.

*Gestation in one Horn of a Bifurcated Uterus.* The unilateral location may give it the appearance of an ovarian cyst or of a myoma.

QUESTION IV. : Is there a uterine enlargement due to other causes than pregnancy ?

<sup>1</sup> Adapted from Peaslee's Ovarian Tumors, p. 139.

The pathological conditions suggested by the question are these:

Uterine myoma.	Hæmatometra.
Uterine sarcoma.	Hydrometra.
Uterine carcinoma.	Pyometra.
Metritis.	Physometra.

Differentiation of Uterine Myoma from Ovarian Cystoma.<sup>1</sup>

UTERINE MYOMA.

1. Slow growth.
2. Facial expression unchanged. Face may be full and flushed, later pale from hemorrhage.
3. General health usually unimpaired except from loss of blood. If submucous or mural, may be painful.
4. Abdomen usually very asymmetrical from irregular shape of tumor.
5. Abdominal veins not usually enlarged.
6. Action of kidneys normal.
7. Usually menorrhagia.
8. Elasticity, not fluctuation. No percussion wave.
9. Surface firm and usually lobulated.
10. Vaginal touch and conjoined examination show tumor dense and firm, and, unless pedunculated, continuous with uterus. Uterus large and heavy.
11. Uterine cavity much elongated.
12. Uterus moves with tumor.
13. Negative results from aspiration.

*Exception.*—A subperitoneal myoma with a long pedicle moves independently of the uterus, and the uterine cavity is not necessarily lengthened. If the myoma has degenerated to a fibrocyst there will be more or less fluctuation, and aspiration may yield positive results.

OVARIAN CYSTOMA.

1. Usually more rapid growth.
2. Facies ovariana.
3. General health early impaired from emaciation. Not painful.
4. Abdomen more symmetrical, especially when tumor is large.
5. Usually enlarged, especially in large polycysts.
6. Kidneys less active.
7. Menstruation unchanged or diminished.
8. Fluctuation marked. Percussion wave marked.
9. Surface yielding; in monocysts, regular; in polycysts, irregular.
10. Uterus normal except displacement from pressure. Tumor compressible, fluctuating, detached from uterus.
11. Not materially elongated. (This is a most important diagnostic point.)
12. Does not move with tumor.
13. Positive results.

*Exception.*—A cyst with semi-solid contents yields negative results on aspiration. Fluctuation, if present, is indistinct. Percussion wave is absent or indefinite.

Differentiation of Uterine Sarcoma and Carcinoma from Ovarian Cyst.

The relations of these growths to the uterus are similar to those of myoma. The above tabulated statement, therefore, in the main holds good. Malignant uterine tumors differ from myoma in these particulars, viz., more pain, great tendency to early ulcerative and other degenerative changes, more profuse hemorrhages, offensive watery or bloody discharge, and a speedy fatal result.

Differentiation of Metritis from Ovarian Cyst.

Metritis gives a history of inflammation, and is apt to be associated with parametritis, salpingitis, and ovaritis. The uterus is never en-

<sup>1</sup> Adapted from Peaslee's Ovarian Tumors, p. 145.



larged to more than two or three times its normal size, and in form is always symmetrical. Conjoined examination will show that there is no extra-uterine growth. There are also tenderness on pressure and diminished mobility.

Differentiation of Hæmatometra, Hydrometra, Pyometra, and Physometra from Ovarian Cyst.

The uterine enlargement is always symmetrical, and the organ, whether distended with blood, serum, pus, or gas, gives a greater or lesser sense of fluctuation, but not the clear fluctuation of a cyst. See Retained Menstruation, Chapter XXXVIII. Examination will show that the os externum or the cervical canal at some point is completely closed. Unless the Fallopian tubes are also distended the enlargement will be entirely confined to the uterus.

QUESTION V. : Is the enlargement extra-uterine, and possibly due to inflammation ?

This question suggests the following conditions:

Parametritis.	Hydrosalpinx.
Pelvic abscess.	Peritonitis.
Pyosalpinx.	Pericæcal abscess.

The history of inflammation and the close relations of the enlargement to the uterus will aid greatly in the recognition of any of these diseases. In all, except possibly hydrosalpinx, there will be great tenderness on pressure. Sactosalpinx, whether the tube be distended with serum, pus, or blood, will usually be identified by its location to the side and back of the uterus, but more especially by the irregular, elongated, tortuous, or ovoid form of the mass. A pus-tube is much more likely to be adherent than an ovarian cyst of the same size. A parametric abscess is always continuous with the side of the uterus and situated in the broad ligament. Suppuration, anterior or posterior to the uterus, is also inseparable from the uterus. Pericæcal abscess or appendicitis may be suspected from its location.

QUESTION VI. : Is the tumor of abdominal origin, and therefore not ovarian ?

A large ovarian cyst may have a pedicle so long as to permit the entire tumor to rise out of the pelvis into the abdominal cavity. It may even be possible to insert the hand deeply between the tumor and the symphysis pubis. Conjoined vaginal and rectal touch may not discover the pedicle, nor establish the pelvic origin of the cyst; it is sometimes difficult to differentiate such a cyst from other tumors of abdominal origin.

The following pathological conditions are suggested :

Ascites.	Enlarged liver.
Encysted ascites.	Mesenteric cyst.
Hydatid cysts.	Cysts of the urachus.
Renal cysts.	Enlarged gall-bladder.
Displaced or floating kidney.	Intestinal tumors.
Pancreatic cyst.	Fatty tumors.

Differential Diagnosis of Ascites and Large Ovarian Cyst.<sup>1</sup>

ASCITES.

1. Previous history of visceral disease.
2. Enlargement comparatively sudden.
3. Face puffy; color waxy; early anæmia.
4. Patient on back, enlargement symmetrical; flat in front.
5. Sitting up, abdomen bulges below.
6. Navel prominent and thinned.
7. Fluctuation decidedly clear, diffuse throughout abdomen, but avoids highest parts in all positions, and always has a hydrostatic level.
8. Intestines float on top of fluid; hence percussion gives clear tympanitic note over the highest parts of abdominal cavity, and dulness in lowest parts for all positions—*i. e.*, areas of resonance and dulness change with position.
9. Vaginal touch detects fluctuation, bulging into vagina.
10. Uterus in prolapsed location, but position unchanged. Size and mobility unchanged.
11. Hydragogues and diuretics temporarily remove the fluid.
12. Fluid light straw color and thin. Coagulates spontaneously.

*Exceptions.*—The intestines may be adherent to the posterior part of the abdominal cavity, and the fluid may therefore be in the anterior part, or the amount of fluid may be so great that the intestines held back by mesentery or adhesions cannot float to its surface; then the areas of resonance and dulness, except on very deep percussion, may be similar to those of a cyst.

Gas in the colon may produce clearness in the flanks.

Encysted ascites, *i. e.*, fluid confined to a limited part of the abdomen by adhesion, may give the same areas of dulness and resonance as a cyst.

OVARIAN CYST.

1. No such history.
2. Gradual.
3. Facies ovariana. Anæmia later.
4. Asymmetrical until tumor is quite large; prominent in front.
5. No appreciable change.
6. Navel usually unchanged.
7. Less clear; limited to cyst; not modified by change of position. No hydrostatic level.
8. No change in areas of dulness and resonance with change of position. Dulness over cyst. Clear resonant note in all parts beyond cyst limits—*i. e.*, in the flanks and toward the diaphragm.
9. Vaginal fluctuation less clear or absent.
10. Uterus displaced forward or backward, or laterally by pressure of cyst.
11. Medicines have no effect.
12. Fluid light or dark and of varying consistency. Albuminous, but does not coagulate spontaneously. May contain colloid matter.

*Exceptions.*—Flanks may be dull from feces in the colon.

Cyst may communicate with the intestines and be filled with gas. This would give a tympanitic note all over the cyst.

The cyst may be small and glued to the posterior part of the abdominal cavity by adhesions. The intestine might then be in front of it and give a tympanitic note over the most prominent part of the enlargement.

Ovarian cyst and ascites may coexist. If the cyst be small, and in a stout woman, the diagnosis without exploratory incision may be most difficult.

Differentiation of Hydatid Cysts from Ovarian Cysts.

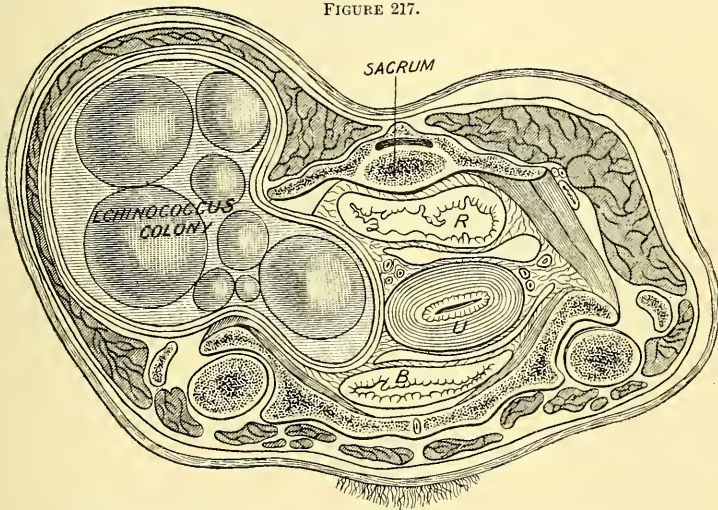
Hydatid, or echinococcus, cysts are sometimes difficult to distinguish from ovarian tumors. They may originate either in the pelvis or in

<sup>1</sup> Adaptation from Peaslee's Tumors, p. 134.

the abdomen. Hydatid cysts of pelvic origin may be in the broad ligament or immediately beneath the uterine or pelvic peritoneum. Hydatid abdominal cysts may originate in the omentum or liver. If of abdominal origin and of small size, their location will usually prove them to be extrapelvic, and therefore not ovarian. The qualifying word "usually" is introduced because the writer once encountered a small ovarian cyst adherent to the liver. The pedicle was very slender and about seven inches long.

Large abdominal hydatid cysts may extend into the pelvis, and, like those of pelvic origin, closely simulate ovarian disease. These cysts are rarely painful unless inflamed. When they distend the abdomen, they project as a mass of small, rounded, tense, elastic bodies; the individual projections are smaller than those of ovarian cysts. Fluctuation is distinct. Suppuration will give rise to signs of an abscess in addition to those of hydatids.

FIGURE 217.

Hydatid cyst in the pelvis. U. Uterus. B. Bladder, R. Rectum.<sup>1</sup>

Definite diagnosis is impossible without aspiration. The fluid will usually show the characteristic hooklets. It is slightly alkaline, or neutral, non-albuminous, has a specific gravity of about 1010, and contains chloride of sodium. Fragments of the characteristic laminated lining of the cyst may come away through the aspirator.<sup>2</sup>

Degenerative processes may cause rupture of the cyst and discharge of its characteristic vesicles, hooklets, or membranes through the vagina, rectum, or bladder; the diagnosis is then clear. Hydatid cysts are rare.

#### Differentiation of Renal Tumors and Ovarian Cysts.

The distinction between renal tumors and other abdominal and pelvic enlargements is often extremely difficult. They have been

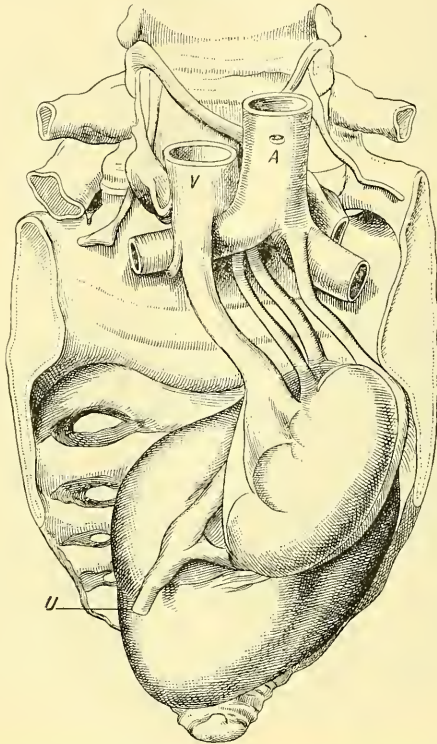
<sup>1</sup> After Freund.

<sup>2</sup> Adaptation from Bland Sutton. *Surgical Diseases of the Ovaries and Fallopian Tubes*, p. 183.



repeatedly mistaken, not only for ovarian tumors, but as well for tumors of the pancreas, liver, spleen, intestine, omentum, and uterus. Until the exploratory incision has been made, the greatest knowledge and care may be inadequate to a diagnosis. The enlarged kidney has been found, not only so loose as to occupy almost any location

FIGURE 218.



Kidney in the hollow of the sacrum. A. Artery. V. Vein. U. Ureter.<sup>1</sup>

or position in the abdomen or pelvis, but fixed by adhesions in its mal-locations—for example, to the pelvic brim and even in the sacrum. In such cases the clinical history and rational signs—including urinalysis—will usually give evidence of renal disease. A renal cyst may be hydronephrosis or pyelonephrosis.

HYDRONEPHROSIS.

1. Enlargement unilateral and from above downward. Growth fixed in region of kidney.
2. Expression unchanged.
3. Growth usually slow.
4. Intestines may be in front of tumor.

OVARIAN CYST.

1. Enlargement at first unilateral, later symmetrical and from below upward. No fixation.
2. Facies ovariana.
3. Growth relatively rapid.
4. Intestines in the flanks above and back of tumor.

<sup>1</sup> Bland Sutton. Surgical Diseases of the Ovaries and Fallopian Tubes, p. 191.

HYDRONEPHROSIS.

- 5. Fluid not necessarily albuminous; may contain calculi.
- 6. Vaginal touch negative.
- 7. Urine may contain pus, blood, or albumin.

*Exceptions.*—In case of a movable kidney, the tumor may not be fixed.

OVARIAN CYST.

- 5. Fluid albuminous; no calculi.
- 6. Tumor usually felt by vaginal touch.
- 7. Urine normal.

*Exceptions.*—In case of adhesions the cyst may be fixed.

In pyelonephrosis the symptoms of suppuration will also be present.

Pancreatic cyst, enlarged liver, mesenteric cyst, cyst of the urachus, enlarged gall-bladder, intestinal tumors, subperitoneal or omental fatty tumors may all grow to large size, and have been mistaken for ovarian cysts. With ordinary care and skill, however, such mistakes are not very likely to arise. All these tumors develop from above downward, and may usually be distinguished from ovarian cyst by their location and physical characteristics. They do not produce the facies ovariana, and, unlike ovarian cyst, are usually beyond the reach of vaginal touch.

Exploratory Incision.

Finally, in cases of doubt, the question may be settled by exploratory incision. Indeed, every ovariectomy—yes, every abdominal section—should begin as an exploratory incision. As Mr. Tait has wisely said: “One may easily turn an exploratory incision into a complete operation, but it may be a serious matter to turn an incomplete operation into an exploratory incision.”

CHAPTER XXXIV.

OVARIOTOMY.

ELECTRICITY, incision and drainage, and numerous drugs have been tried in the treatment of ovarian cysts; they are all useless. The treatment is summed up in a single word—ovariotomy. The operation was first performed in 1809 by an American surgeon, Dr. Ephraim McDowell, of Danville, Ky.

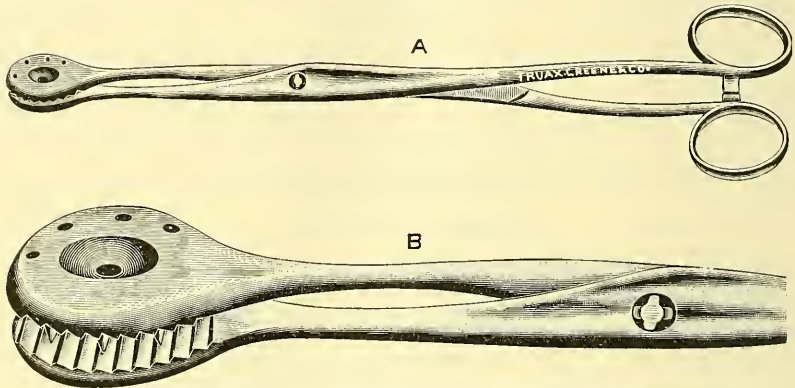
Removal of the Ovarian Cyst.

- The subdivisions of the subject are these:
- Preparatory treatment.
  - The abdominal incision.
  - Emptying and delivering the cyst.
  - Ligature of the pedicle.
  - Closure of the wound.
  - Drainage.
  - After-treatment.
  - Accidents and complications.

The Preparatory Treatment and arrangements for the operation, including the selection of sponges, ordinary instruments, operation-table, and assistants, have been outlined in the General Consideration of Major Operations, Chapters II. and VI. The instruments and appliances specially required are :

- 16 Small pressure-forceps, Figure 82.
- 6 Long pressure-forceps, Figure 83.
- 2 Nélaton forceps, Figure 219.

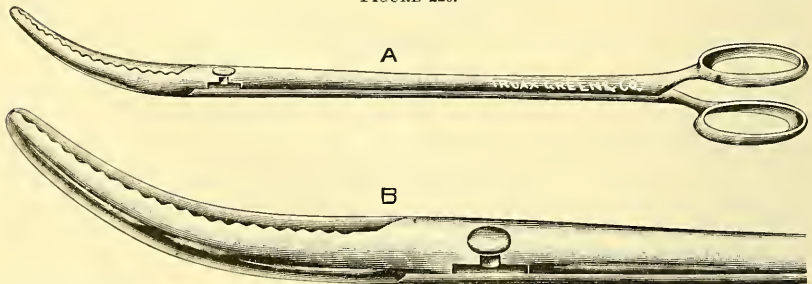
FIGURE 219.



Nélaton forceps. A. Reduced size. B. Section of full size.

- 1 Scalpel.
- 2 Pairs of straight scissors, long and short.
- 1 Ovariotomy trocar, Figure 221.
- 2 Peaslee's needles, Figure 222.

FIGURE 220.



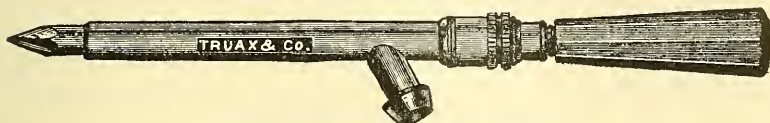
Curved forceps for clamping pedicle before applying ligature. A. Reduced size. B. Full size.

- 12 Needles for closing the abdominal wound.
- Drainage-tubes.
- 12 Short needles, round at the point, for intraperitoneal plastic work, Figure 67.
- 1 Rubber sheet.
- 1 Bucket to catch the cyst fluid.
- 1 Small, curved trocar.
- 4 Retractors.



The Abdominal Incision. Ovariotomy, except for small, non-adherent cysts, is performed by abdominal section. The incision is made through the abdominal wall in the median line near the pubis,

FIGURE 221.



Emmet's ovariotomy trocar. Reduced size.

and has already been described on page 108. Vaginal section, sometimes used for very small cysts, is described on page 108. Ordinary,

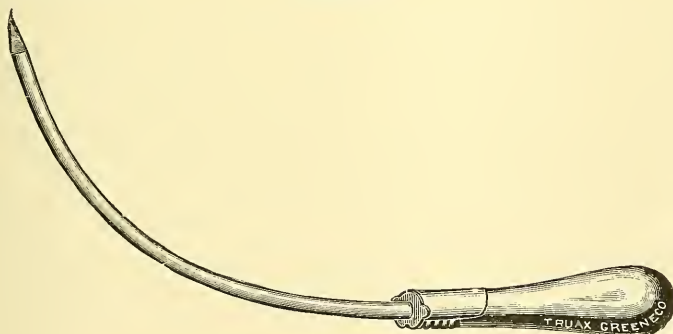
FIGURE 222.



Peaslee's needles. Reduced size.

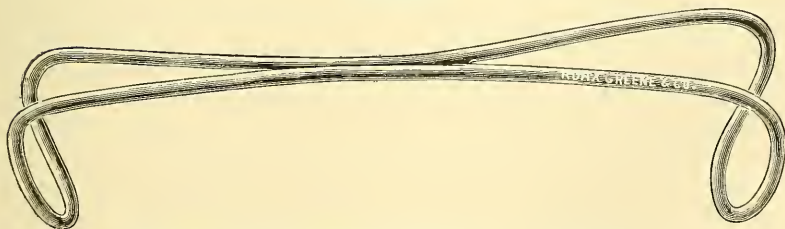
uncomplicated ovariotomy requires an incision not more than two or three inches long.

FIGURE 223.



Small, curved trocar for emptying small cysts. Reduced size.

FIGURE 224.



Retractor for drawing apart abdominal wound. Reduced size.

Emptying and Delivery of the Cyst. As soon as the peritoneal cavity is opened the cyst, of peculiar blue or grayish-white color, is seen directly through the opening. The cyst being exposed, the assistant

turns the patient partly on the side, so that the abdomen will be directed toward the operator, and holds her steady. The trocar, with an attached rubber tube, is then thrust through the cyst-wall, and the fluid is drawn off into a bucket provided for the purpose.

As soon as the fluid begins to flow the cyst-wall is seized close to the trocar with the Nélaton or long forceps—one or two pairs—and as the sac empties its collapsing walls are rapidly drawn through the abdominal wound. A non-adherent monocyst with thin walls is usually delivered in this way with great ease.

In case of a polycyst the point of the trocar may, without complete withdrawal, be successively thrust into one compartment after another until all are emptied and the collapsed sac is delivered.

The obstacles to the delivery of the sac are: 1. Secondary cysts. 2. Semi-solid or semi-fluid contents, and solid portions of the cyst. 3. Adhesions.

The secondary cysts may be too numerous to be tapped by the trocar, Delivery may then be accomplished through a larger incision, or, the trocar having been withdrawn, one or two fingers, and, finally, the left hand, introduced into the sac breaks up the partitions between the secondary cysts—as it were, eviscerates the cysts. During this manipulation the forceps in the right hand must keep the opening in the cyst-wall drawn well outside of the abdominal incision. This is important to prevent the escape of the cyst-fluid into the abdomen.

Semi-solid or semi-fluid contents found in dermoid and colloid cysts will not run through the trocar. Often tumors are partly cystic and partly solid. A longer incision is necessary for the delivery of such non-collapsible tumors. This is made upward and to the left of the umbilicus with scissors and the left index-finger as a guide.

Adhesions are the most common obstacle to the easy delivery of the sac. They may be parietal or visceral. The general technique in adhesions is described on pages 110 and 255. The cyst should usually be tapped and the fluid drawn off before the adhesions are broken. The different parts of the sac from which adherent intestine, omentum, and other structures are to be separated may usually be brought successively into the opening and the adhesions broken until the tumor is free. If this cannot be done, the incision is lengthened and the adhesions separated *in situ*. In loosening adhesions it is well to secure bleeding points, as they occur, by forcipressure, or torsion, or fine catgut ligatures. The tumor having been freed, the operation proceeds as already described for a non-adherent tumor.

Ligature of the Pedicle. The cyst having been drawn through the abdominal incision, the pedicle is tied with catgut close to the horn of the uterus, and the tumor cut off with scissors about one inch from the ligatures. Pedicle sutures to keep the ligatures from slipping are described on page 251. Instead of ligaturing the pedicle *en masse*, the tumor may be removed and hæmostasis secured by suture and ligature of the broad ligament, as described for the removal of the uterine appendages on page 252. The latter method is preferred. See pages 247 to 253.

Cyst fluid may be perfectly innocent, or may, from suppuration or

other causes, contain infectious matter. The thick, gelatinous contents of colloid and of dermoid cysts are usually infectious, and, if brought in contact with the peritoneum, may cause dangerous infection. In order to avoid such contamination it is often safer, when the fluid is known to be infectious, to make a long incision and deliver the tumor intact without attempting to puncture the cyst and draw off the fluid.

**Closure of the Wound, Drainage, and After-treatment.** These subjects have been fully considered in Chapters VI., VII., and VIII.

The **Accidents and Complications**<sup>1</sup> are such as may occur in abdominal sections for any purpose.

*Extrusion* of the bowel during the operation should be prevented by the assistants; if it occur, the bowel should be immediately returned and held in by broad gauze pads or towels.

*Stripping of the parietal peritoneum* from the abdominal wall under the impression that it is an adherent cyst may occur even to the experienced operator. Peritoneum thus detached is apt to slough, and would, therefore, if not too extensive, better be removed with the tumor; if not removed there should be drainage of the space between the detached peritoneum and the subjacent structures.

*Rupture of the cyst wall* and escape of its contents is harmless if the fluid is innocent; unfortunately, the thin, friable, gangrenous cysts which are apt to contain infectious fluid are the ones most liable to rupture. The clear indication, then, is thoroughly to irrigate the cavity with normal salt solution—six-tenths of 1 per cent. If there is anticipation of rupture one may pack sponges around and under the cyst to absorb the fluid as it escapes.

*Injuries to the intestines, ureter, or bladder* are sometimes unavoidable. The bowel is specially liable to be opened in breaking up adhesions. In operating deep in the pelvis the bladder or ureter, even by a careful operator, may be cut. Injury to the intestine or bladder should be immediately repaired by suture. If the ureter has been cut the surgeon will have recourse to one of the following procedures: 1. The cut ends may, if practicable, be reunited by end-to-end approximation after the method of Dr. Weller Van Hook. 2. The attempt may be made to turn the ureter into the bladder. 3. The ureter may be brought out through the abdominal wound. 4. The kidney on the affected side may be removed.

*Foreign bodies left in the abdomen*, such as sponges, forceps, and other instruments, have caused numerous deaths, not only after ovariectomy, but after many other abdominal operations. See page 114.

Intestinal obstruction, the principles of drainage, and the after-treatment have been presented on pages 118 to 134.

### Removal of Intraligamentous Cysts.

Paroöphorotic, parovarian, and even simple ovarian cysts may develop between the folds of the broad ligament. They are then called intraligamentous. The genesis and mode of development of these cysts

<sup>1</sup> Allbutt. System of Gynecology, p. 898.



have been fully described. The parovarian cyst is easily peeled out of the broad ligament. The paroöphorotic and other papillomatous cysts may, if intraligamentous, present the greatest difficulties in removal. Such tumors often lie deep and firmly fixed in the substance of the broad ligament, and are therefore hard to enucleate.

Before attempting the enucleation two ligatures should be applied, one on the infundibulo-pelvic ligament, the other on the uterine end of the broad ligament. The first ligature cuts off the ovarian artery as it enters the pelvis; the second, if deeply placed, cuts off the utero-ovarian anastomosis. These ligatures deprive the broad ligament and included tumor of a great part of their blood-supply, and the frightful hemorrhage sometimes encountered in the removal of a papillomatous intraligamentous cyst may be therefore measurably avoided by these ligatures. In order to control hemorrhage, one should be prepared, if necessary, to ligature also the uterine vessels, or even to remove the uterus.

The tumor may be removed, according to its depth, in one of two ways: If it is not very deep, and lies rather loosely in the broad ligament, the ligament and cyst sometimes may be excised and removed together. This procedure is very much like that of the removal of the uterine appendages without a pedicle. See page 252.

The other method is that of enucleation. This is sometimes an extremely difficult and hemorrhagic operation. As the enucleation proceeds the bleeding points, so far as possible, are secured by fine catgut ligatures. The sac having been removed, the raw bleeding surfaces between the folds of the broad ligament are temporarily packed with hot gauze sponges to stop the oozing. The redundant portions of the ligament may be trimmed off with the scissors, the edges may be turned in and united with deep interrupted or continuous sutures. If the cavity from which the sac was enucleated is too large to be obliterated by inversion, as above described, or the oozing from its surface is uncontrollable, an opening may be made from the bottom of the cavity close to the uterus directly into the vagina. The end of a long strip of gauze may be carried through this opening into the vagina, the cavity packed full, and the edges of the broad ligaments closed over it. This leaves the bleeding part entirely covered by peritoneum, renders the raw surfaces extraperitoneal, controls hemorrhage, and provides for drainage. Care is necessary in the enucleation, the placing of deep ligatures, and the incision into the vagina to avoid the ureters. They may be dangerously near the field of operation. The gauze may be removed through the vagina in two or three days. This gauze drain is the same as described on page 318.

#### Ovariectomy During Pregnancy.

An ovarian tumor complicated by pregnancy gives rise to the following dangers: 1. Twisting of the pedicle. 2. Abortion. 3. Obstruction to labor, necessitating Cæsarean section or ovariectomy during labor. From these and other possibilities the danger to the life of the child and the mother is extreme. The danger of timely ovariectomy

before labor, as compared with that of the expectant treatment, is relatively small. The indication for early ovariectomy, therefore, is generally clear. Puncture of the cyst, as a substitute for ovariectomy, is permissible only when ovariectomy is impracticable. The chief danger both of puncture and ovariectomy is from possible sepsis and consequent abortion or premature labor. In the complication of pregnancy the necessity for an early, rapid, gentle, clean ovariectomy is apparent. The pedicle always contains large vessels, and should, therefore, be tied with special care. Moderate doses of codeine may be useful in the after-treatment.

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## CHAPTER XXXV.

### TUMORS OF THE FALLOPIAN TUBES, BROAD LIGAMENTS, ROUND LIGAMENTS, AND URINARY ORGANS.

#### Tumors of the Fallopian Tubes.

THE tumors of the Fallopian tubes include myoma, adenoma, adenomyoma, cysts, carcinoma, and sarcoma.

**Myoma** of the tube rarely occurs, seldom obstructs the oviduct, and is commonly too small to be of clinical significance. One case is reported, the size of a child's head.<sup>1</sup> Salpingitis isthmica nodosa and tubercular salpingitis have been mistaken for myoma of the tube.

**Adenoma**, as termed by Bland Sutton,<sup>2</sup> or papilloma, as first described by Doran,<sup>3</sup> is not uncommonly found, though usually small. The growth commonly begins as a small papilloma or wart, and may attain the size of a large orange. It may present the appearance of a so-called hydatid mole, a multiple cyst, or a cauliflower growth. A frequent complication, according to Sutton, is hydro-peritoneum. This results when the abdominal end of the tube is open and the secretion passes from the tube into the peritoneum. When the abdominal end is closed and the uterine end open there may be a bloody discharge through the uterus. The fact of great clinical interest is the frequency with which adenomata undergo malignant degeneration. Early removal of the tube is therefore indicated.

**Adenomyoma.** This is characterized by a small nodular enlargement of the tube. It has been fully described by Recklinghausen, and later by Ries, as originating in the remnants of the Wolffian body. The various nodular enlargements of the tube, including adenomyoma, may be caused by a number of pathological conditions. The differential diagnosis between them must be made by the microscope. They cannot be distinguished by clinical examination.

<sup>1</sup> Sir J. Y. Simpson. From *System of Gynecology*, Playfair and Allbutt, p. 300.

<sup>2</sup> *Surgical Diseases of the Tubes and Ovaries*. Bland Sutton, p. 280.

<sup>3</sup> *Transactions of the Pathological Society of London*, vol. xxxi. p. 174. *Surgical Diseases of the Tubes and Ovaries*. Bland Sutton, p. 280.

Cysts of the tube are of frequent occurrence, but of little clinical importance. Small pedunculated cysts, known as hydatids of Morgagni, are often to be found at the fimbriated extremity. Numerous minute cysts with thin walls are frequently seen on the mucous surface of the tubes.

Carcinoma, as a primary growth, is very rare in the tube, and, when present, is usually the outgrowth of adenoma. Secondary carcinoma may be the result of extension from the ovary or the body of the uterus. It is seldom if ever secondary to cancer of the cervix without first involving the body of the uterus.

Sarcoma of the tube is exceedingly rare, and its origin obscure.

#### Tumors of the Broad Ligament.

Tumors of the broad ligament include myoma, lipoma, cyst, carcinoma, and sarcoma.

Myoma and Lipoma are pathological curiosities and do not grow to large size. The other growths have already been described.

#### Tumors of the Round Ligament.

Tumors of the round ligament include myoma, fibroma, cyst or hydrocele, sarcoma, and carcinoma.

Myoma and Fibroma, according to Coe, are more common in multipara and more frequent on the right than on the left side. The growth may be intraperitoneal or extraperitoneal. Myoma is commonly pedunculated, hard, of slow growth, painless, not tender to pressure, and may be smooth or lobulated. When large, it may cause pressure symptoms; if extraperitoneal it may be found in the inguinal canal or in the labium majus. No impulse upon coughing or straining is transmitted by the tumor. Reduction of the growth is impossible unless small and near the internal inguinal ring. During pregnancy it may rapidly increase in size.

The *diagnosis* is from ovarian and omental hernia, enlarged inguinal glands, and cysts of the glands of Bartholin. *Ovarian hernia* is recognized from myoma of the round ligament by being ovoid in form, tender to pressure, possibly reduced on pressure, and by its increase in size during menstruation. *Omental hernia* may be as hard as myoma and impossible to recognize without an exploratory incision. *Enlarged inguinal glands* are distinguished by the history of infection and by the lobulated outline. *Cysts of the glands of Bartholin* are distinguished by their location. In myoma the tumor originally lies above the location of the glands of Bartholin. Exploratory puncture will serve to identify the cyst. The treatment is extirpation.

Cyst or Hydrocele. This is supposed to be developed within the canal which represents the original round ligament, the canal being at first hollow instead of solid. It may appear in the form of several cysts, or of a collection of fluid either within the inguinal canal or at the external ring. Schroeder reports a case in which there seemed to be a communication between the cyst and the peritoneal cavity; at



least the fluid could be forced by pressure inside the abdomen. The writer has never observed a case of hydrocele in the round ligament. The above is adapted from Coe in Keating and Coe's *Clinical Gynecology*. The differential diagnosis is from myoma of the cord and inguinal hernia. From *myoma* it is distinguished by the sense of fluctuation and by exploratory puncture. From *hernia* the growth is distinguished by not transmitting an impulse of coughing, by failure to reduce by taxis, and by fluctuation. The treatment is extirpation of the sac and direct suturing.

Sarcoma and Carcinoma are so rare as to be of interest chiefly as mere pathological curiosities.

#### Tumors of the Urethra.

Most new growths in the urethra, except as they develop by extension from the vulva or vagina, are rare; when they occur their most common seat is the meatus urinarius. Caruncle, mucous polypi, condylomata or warts, carcinoma, and sarcoma are the principal examples.

Urethral Caruncle is not rare. It is a small, soft, red, friable mass situated usually at the margin of the meatus and on its vaginal side. It may, however, be anywhere in the urethra. The growth occurs in nervous, irritable women, and, though no age is exempt, is most frequent at or near the menopause. There is often a previous history of pelvic disease. Contact of the part with irritating discharges from above is among the commonly assigned causes.

Microscopic examination of the growth shows the papillary layer of the urethral mucosa to be softened and atrophied. The walls of the capillaries for this reason are deprived of their natural support, and therefore dilate. This explains the vascularity and the tendency to bleed. The nerve filaments are exposed, and therefore abnormally sensitive. These histological facts explain the friability, vascularity, and hyperæsthesia. The sensitiveness in these growths is often so extreme as to cause the greatest agony on urination. There is great vascularity, which may cause bleeding even upon light touch.

The differential diagnosis with inflammation of Skene's glands has already been discussed on page 274.

*The treatment* is excision with the scissors under the base of the growth and union of the wound by suture. The cautery is commonly used, but is disapproved on account of its unnecessarily destructive and cicatricial effects.

Warts, Mucous Polypi, Carcinoma, and Sarcoma follow the same principles of pathology, diagnosis, prognosis, and treatment as when they occur in the vulva.

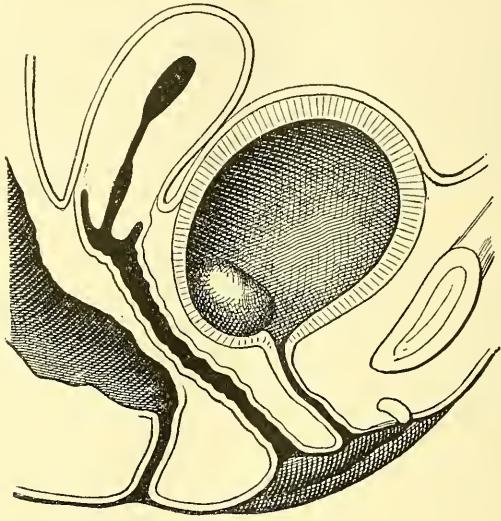
#### Tumors of the Bladder.

Tumors originating in the bladder are rare. They occur much less frequently in the female than in the male bladder.

*Benign tumors*, especially if polypoid, are easily removed through an artificial vesico-vaginal fistula. Hæmostasis may, if necessary, be

secured by leaving the forceps for a time on the stump. A sessile growth, on account of the inaccessibility and hæmorrhagic tendencies, is much

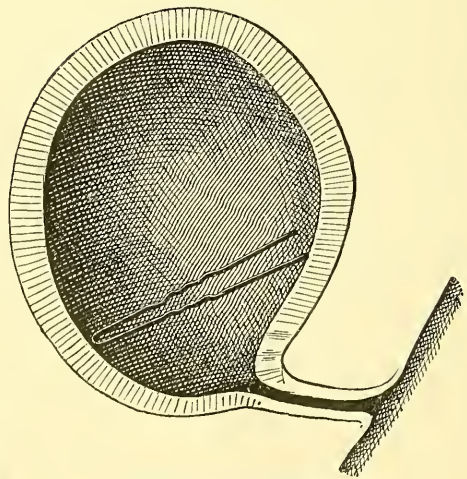
FIGURE 225.



Stone in the bladder.<sup>1</sup>

more difficult of removal. Diagnosis is made by cystoscopy. See page 72.

FIGURE 226.



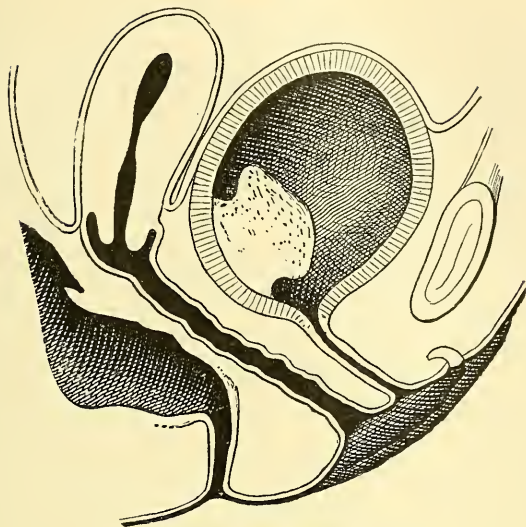
Hairpin in the bladder.<sup>2</sup>

*Malignant disease* is almost always an extension from the cervix uteri. The treatment is wholly palliative.

<sup>1</sup> Auvard; illustrated. Falle aus der Frauen Praxis.

<sup>2</sup> Ibid.

FIGURE 227.

Tumor in the bladder.<sup>1</sup>

The differential diagnosis of vesical tumors is with stone and other foreign bodies in the bladder. Figures 225, 226, and 227 show a stone, a hairpin, and a tumor in the bladder.

## CHAPTER XXXVI.

### TUBAL PREGNANCY.

TUBAL pregnancy includes all forms of gestation that originate outside of the uterine cavity. The old idea, that extra-uterine pregnancy comprised three types, viz., tubal, ovarian, and abdominal, has become obsolete; no authentic case of gestation originating in the ovary or upon the peritoneum has ever come to light. So far as known, all ectopic gestation originates in the Fallopian tube. Pregnancy in a rudimentary horn of a bicornate uterus is virtually a tubal pregnancy.

Ectopic pregnancy was formerly considered a rare condition. Now we know it to be of relatively common occurrence. Certain accidents, such as hæmatosalpinx, retro-uterine hæmatocele formerly attributed to other cases, are now recognized, in the vast majority of cases, at least, as being due to rupture of the gestation-sac of tubal pregnancy.

<sup>1</sup> Auvard; illustrated. Falle aus der Frauen Praxis.



### Etiology.

The causes of tubal pregnancy, though the subject of a vast amount of speculation, are obscure. If fecundation in the human species normally occurs only in the cavity of the uterus, as held by Tait and Bland Sutton, then we must consider tubal pregnancy due to an abnormal fecundation of the ovum by vagrant spermatozoa in the tube. It is not established, however, that these authorities are correct. Assuming that spermatozoa normally wander beyond the uterus, and that the ovum may normally receive its fertilization before it finds a uterine attachment, it follows that some abnormal condition either in the ovule or in the tube might cause the ovule to implant itself in the tube.

The diameter of the human unimpregnated ovum is not over two-tenths of a millimetre; that of the tube two or three millimetres; after impregnation the ovule rapidly increases in size, but under ordinary conditions there is ample time for it to pass into the uterus before too much enlargement takes place. The great majority of tubal pregnancies, moreover, occur toward the abdominal end of the tube—that is, in or very near the ampulla, where the tube is large. The question of the size of the tube, therefore, is not very pertinent to this discussion. Reversed peristalsis or anti-peristalsis, pressure of tumors on the tube, false passages, accessory tubes, accessory openings, great length and tortuosity, kinks, want of development, hernia, and diverticula of the tubes have also been suggested as causes, but they fail to account satisfactorily for the phenomena. Moreover, there are no good grounds for the inference that the accident is often due to any of these causes.

Lawson Tait has urged that the ovum requires a surface denuded of its epithelium for its attachment. He declares that the normal uterus, by shedding the epithelium at each menstruation, furnishes this condition, and that the tubal epithelium is denuded as a result of salpingitis. This speculation is weakened by two facts: First, the uterine epithelium is probably not denuded as a result of menstruation; second, tubal pregnancy has occurred when there were no evidences of salpingitis; moreover, pregnancy may occur in woman, as it does in the lower animals, without menstruation. Neither menstruation nor salpingitis, therefore, is essential to the attachment of the ovule to the uterus or tubal mucosa.

Tubal pregnancy is common after long periods of sterility. This is possibly, in part at least, explained by the fact that chronic salpingitis may, by the thickening of the tube and destruction of the cilia, prevent the normal passage of the ovule to the uterus and, at the same time, favor its implantation in the tube.

According to Webster,<sup>1</sup> tubal pregnancy is explained as follows: In the earlier type of mammalian development the uterus was bicornate—that is, composed of two horns, of which the Fallopian tubes in the woman are mere rudiments. In other words, the uterus consisted of two highly developed Fallopian tubes. In some women even now, he

believes there is a structural or functional reversion to the ancient type. According to this theory, the stronger the tendency to reversion the greater the liability to tubal pregnancy. This might explain the fact of repeated tubal pregnancies observed in the same individual.

Peritonitic adhesions and bands obstructing the tubes are frequent in ectopic pregnancy; but whether they cause the morbid condition, or result from it, or are only incidental, is uncertain.

If we admit that fecundation takes place normally only in the uterus, and that whenever it occurs elsewhere, as in the tubes, ectopic gestation is the result, the etiology is simple. There are, however, on the contrary, many reasons for the inference that spermatozoa may normally meet the ovum anywhere in the genital passages or even in the abdominal cavity. If this be true, the only condition essential to ectopic pregnancy is that the ovum, after impregnation, finds a surface suitable for its attachment and growth outside the uterus.

There is already a considerable literature on the transmigration of the ovum from the ovary of one side to the tube of the other. Both clinical and experimental examples have been well attested in which pregnancy occurred in the tube, when the ovary on that side was absent. There has been atresia of one tube and tubal pregnancy in the other, but with the corresponding corpus luteum only in the ovary of the closed side. All this proves that the ovum must have passed over through the pelvic cavity to the tube, where it finally lodged.

In conclusion, we submit that the causation of tubal pregnancy is a matter of speculation.

#### Formation of Chorion, Amnion, Decidua, and Placenta.<sup>1</sup>

During the first month or six weeks of tubal pregnancy that portion of the tube where the fertilized ovum is lodged becomes very vascular and turgid. It grows thinner: the mucous membrane becomes stretched and its folds effaced. The changes which occur to the fertilized ovum after impregnation are identical, whether it be in the tube or uterine cavity. The membranes by which the embryo is enclosed are similar to those in intra-uterine gestation. These membranes can be studied to advantage in the so-called tubal moles, which are similar in origin to the uterine moles. The chorion is shaggy with villi, and resembles in gross and microscopic appearances that found in intra-uterine gestation. The villi appear as clusters of circular bodies. The embryo lies within the amniotic cavity, and the structure of the amnion and its relations to the embryo and chorion are almost the same as in intra-uterine pregnancy.

The formation of the placenta in tubal gestation differs in several particulars from one developed in the uterus. In normal gestation the uterine mucosa and the foetal structures both contribute to the formation of the placenta; but in tubal pregnancy the tubal mucosa plays a very insignificant part. A tubal placenta is almost entirely derived from the embryo.

After a careful study of gravid tubes, Bland Sutton states that he

<sup>1</sup> From Bland Sutton, in Allbutt and Playfair's System of Gynecology.

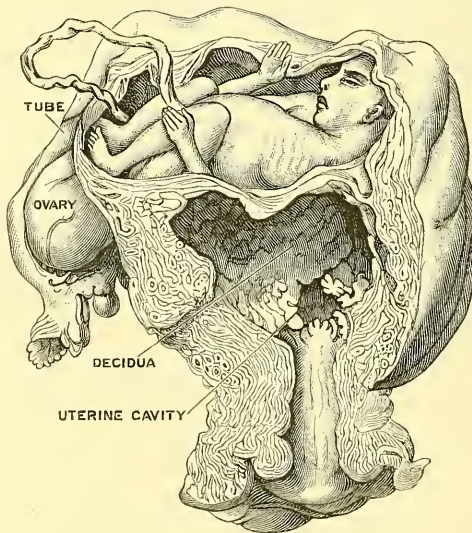
has failed to find a tubal decidua. Although none forms in the tubes, it is a curious circumstance that one forms in the uterus. It is thrown off during false labor, or, if the patient goes on to term, is expelled later in small fragments and without producing pain. This intra-uterine decidua has all the elements of a normal decidua of pregnancy.

The myosalpinx at first undergoes hypertrophy, but soon that portion to which the placenta is attached becomes thinned out, and the bundles of muscular fibres are separated; this favors early rupture.

#### Frequency.

Tubal pregnancy is not infrequent. Indeed, pelvic hamatocele, which is not uncommon, is almost invariably the result of ectopic gestation. In thirty-five hundred general autopsies Formad found thirty-five ectopic pregnancies, or 1 per cent. This is, perhaps, the largest percentage reported. The extirpation of diseased tubes has brought to light many cases of tubal gestation which would not otherwise have been recognized, and has thereby added to our estimate of their frequency; this estimate is still further increased by microscopic diagnosis of the decidua cast off by the uterus in the spurious labor which always occurs at some period of tubal pregnancy.

FIGURE 228.



Interstitial pregnancy.<sup>1</sup>

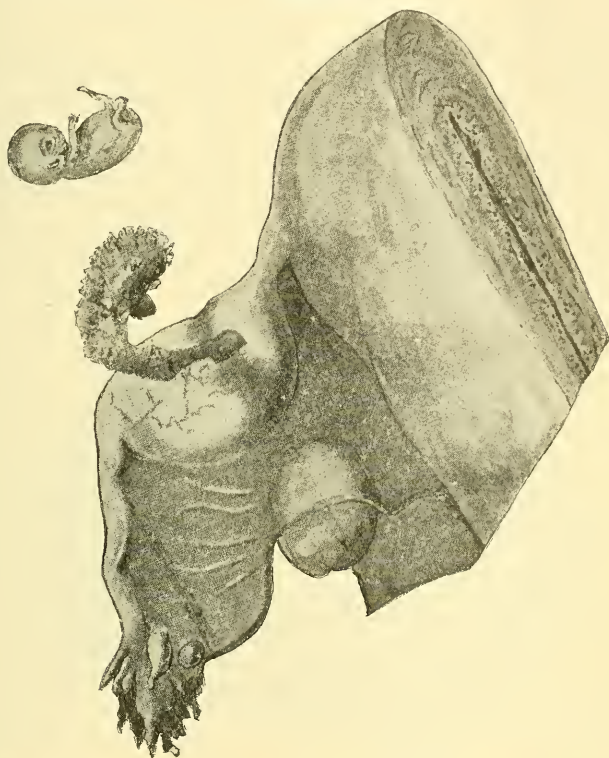
Repetition of tubal pregnancies in the same individual has already been noticed. Both tubes may be simultaneously pregnant. Twin tubal pregnancy in the same tube and concurrent tubal and uterine gestation have been reported. There is no absolute rule as to the

<sup>1</sup> Bland Sutton, in Webster's Ectopic Pregnancy.



frequency of the condition on either side. Tubal pregnancy has been reported after extirpation of the uterus, the tube still having a connection with the vagina.<sup>1</sup>

FIGURE 229.



Ruptured isthmic (intra-ligamentous) pregnancy of right tube. Third month. Marked development of decidua in uterus.<sup>2</sup>

### Varieties.

Tubal pregnancies are designated according as the seat of implantation is respectively at the uterine end, the middle region, or near the abdominal extremity of the tube; that is, they are:

1. Interstitial pregnancy.
2. Isthmic pregnancy.
3. Ampullar pregnancy.

The subvarieties will be noticed in describing each type. The primary classification depends upon the original site of implantation, not upon subsequent accidents of development or secondary changes. A normal pregnancy may become extra-uterine by rupture of the uterus, as in an actual case reported by Leopold,<sup>3</sup> but that does not make it extra-uterine in the sense here considered.

<sup>1</sup> Wendiles. Monatschrift für Geburtshülfe und Gynäkologie, 1895. Centralblatt für Gynäkologie, 1896, No. 4.

<sup>2</sup> A. Martin. Die Krankheiten der Eileiter.

<sup>3</sup> Archiv für Gynäkologie, 1896, lvii. p. 376.

1. **Interstitial Tubal Pregnancy.** This is by far the least frequent form. Lodgement of the ovum takes place in that part of the tube which traverses the uterine wall, and the foetus develops in a cavity formed in the substance of the uterus. This cavity may open into that of the uterus, making a tubo-uterine pregnancy, or it may, in rare instances, extend outward between the layers of the broad ligaments. Webster<sup>1</sup> concludes that in some cases of interstitial pregnancy the ovum develops in the side wall of the uterus in a diverticulum formed by incomplete fusion of Müller's ducts, which sometimes occurs in this particular region. Pregnancy in a rudimentary horn of the uterus, although having a pathology of its own, is yet not unlike a tubal pregnancy. The course and outcome of interstitial pregnancy will be noticed later in connection with that of the other forms.

FIGURE 230.



Ampullar pregnancy. Right tube. Fœtus surrounded with coagulated blood. Longitudinal section.<sup>2</sup>

2. **Isthmic Pregnancy** is more frequent than interstitial, less frequent than ampullar pregnancy. The ovum is lodged in the middle region, and there is generally, before rupture, a spindle-shaped dilatation of the tube. So-called pedunculated tubal pregnancy is possible in this part of the tube, and has in a few cases gone to term. This occurs when the ovum is lodged in a diverticulum or angle of the tube. Under such conditions the walls of the tube may be thick or thin in parts, with a consequent greater liability to rupture in the thin parts.

3. **Ampullar Pregnancy.** This is the common variety. The attachment of the ovum takes place in the ampullar or outer third of the tube. Tubo-ovarian pregnancy occurs when there is a prior adhesion

<sup>1</sup> Ectopic Pregnancy, p. 77.

<sup>2</sup> From A. Martin. Die Krankheiten der Eileiter.

of the ampulla to the ovary, so that both contribute to form the gestation-sac. This is a subdivision of ampullar pregnancy.

#### Development and Course of Tubal Gestation.

After the ovum has attached itself to the tubal wall it continues to develop. Naturally the conditions are not so favorable as in normal gestation: the tubal walls are less suited to its lodgement, and contribute less fully to its nourishment and development than does the uterus in normal pregnancy. Unless the ovum is inserted well in toward the uterus, as in interstitial pregnancy, the whole tube becomes extravascular, turgid, thinner, and, in most cases, less and less resistant. The margin of peritoneum around the ostium abdominale thickens and forms a ring about the fimbriæ. This ring by the eighth week usually closes over and shuts up the tube. The development of the ovule in the tube, so far as the conditions will permit, continues to follow the same course as in the uterus.

As the fœtus enlarges, the course of gestation will be modified in one of the following ways:

*a.* The fœtus, if in or near the ampulla, may be expelled from the tube through the ostium abdominale into the abdominal cavity. This is called tubal abortion.

*b.* The tube may rupture and partly or wholly discharge the fœtus in either one of four directions:

1. Into the abdominal cavity.
2. Into the space between the broad ligaments.
3. Into a space formed by adhesions between the tube and ovary.
4. Into the uterus.

*a.* Tubal Abortion necessarily occurs while the ostium abdominale is still open; that is, before the eighth week. The nearer the implantation of the ovule to the ostium the greater the liability to abortion. In this accident the product of conception, sometimes called tubal mole, is discharged with free hemorrhage through the still open ostium into the abdominal cavity. The hemorrhage gives rise to the formation of intraperitoneal pelvic hæmatocele. The accident may be fatal from shock and loss of blood, or the patient may recover. In some cases the mole lies quiescent in the tube, and if only partially detached it gives rise to repeated and dangerous hemorrhage. The false uterine decidua is usually thrown off with uterine hemorrhage when the tubal abortion takes place. The latter occurrence may be, as it were, masked by the uterine hemorrhage. Tubal abortion does not occur in interstitial and is rare in isthmic pregnancy; after occlusion of the ostium it can hardly occur even in the ampullar variety.

*b.* Tubal Rupture. Rupture of the tube may occur at any period. It is not very usual in the first month, is quite liable to occur in the second, and rapidly becomes less frequent after the beginning of the third, and usually occurs before that time. It may be due to direct tension on the tubal walls from the growing fœtus, but is commonly brought about by hemorrhage between the ovum and the sac. Among the other causes are mechanical violence from falling, jumping, digital



examination, and coitus. The rupture usually takes place where the hemorrhage begins—that is, at the placental insertion. The foetal membranes are not necessarily involved in the tear. If the ovum still retains its placental insertion, as it does in rare cases, it may continue to grow. More commonly it is extruded through the ruptured tubal wall and passes into the abdominal cavity, or it may pass downward between the folds of the broad ligament or into a cavity formed by adhesions between the tubal wall and the ovary.

Rupture in interstitial pregnancy may be either into the abdomen, where it is apt to be rapidly fatal from hemorrhage and shock, or into the uterine cavity, where the pregnancy may continue as in normal gestation. Rupture into the uterus may occur much later than the fourth month.

If the foetus in ampullar or isthmic pregnancy is not entirely cut off by rupture from its nutritive connections or disorganized by hemorrhage, and especially if the rupture is into the space between the folds of the broad ligaments or into a tubo-ovarian cavity, gestation may go to full term. If the foetus and its investing membranes escape into the general peritoneal cavity, the placenta remaining in the tube, it is possible, though rare, for development to continue.

The old notion that a free embryo could escape and ingraft itself on the peritoneum is obsolete. The experiments of Leopold on dogs demonstrate the great absorbing power of the peritoneum, and indicate that no organism thus introduced could possibly survive.

In very rare instances the pedunculated isthmic pregnancy already mentioned may go to term in the unruptured tube.

If rupture occurs early in pregnancy the hemorrhage may be slight, but after the first month it is apt to be formidable, and often causes death in a few hours. If the hemorrhage is slight we have the common type of retro-uterine hæmatocele, which, if not aggravated by repeated bleedings, is generally encysted and gradually absorbed. In isthmic and ampullar gestation the rupture is often downward between the layers of the broad ligament; the blood is then poured out into this confined space. The natural tendency of this confinement is to check the hemorrhage. The blood thus accumulated is called a broad-ligament hæmatocele. The more gradual the rupture and the more slight the hemorrhage, the less the general and local disturbance will be. Under such conditions the embryo and its envelopes and placenta will have a better chance to adapt themselves to their enlarged and enlarging quarters, and may go on to term.

If the escaped embryo develops in a cavity formed by the two layers of the broad ligament and the outer wall of the tube, the pregnancy is called *tubo-ligamentous*. As the foetus develops it presses aside and displaces other organs, the layers of the broad ligament become compressed or thickened and form adhesions to surrounding parts, the peritoneum is pressed upward and stripped off from the bladder and abdominal wall, the uterus is displaced to the opposite side and, according to the direction of pressure, upward or downward.

If the placenta is situated in the upper part of the tube so that it is pressed up above the foetus toward the abdomen, forming a tubal

placenta prævia, the danger from secondary rupture of the gestation-sac into the abdomen is very great; such an accident is apt to be fatal. If the placenta is situated below the fœtus toward the mesosalpinx, and pressed down upon the pelvic floor, this danger is less imminent; for rupture in this situation, since it does not of necessity directly involve the placenta, is attended with less hemorrhage and less risk.

All isthmic and ampullar pregnancies, if left to nature, end with the death of the fœtus. The tubo-uterine variety of interstitial pregnancy may, as already explained, result in the passage of the embryo into the uterine cavity and subsequent normal gestation. Tubal pregnancy going on to term seldom results in the extraction of a viable child. The few children who survive the operation for their removal almost always die in early infancy.

### Secondary Changes in Connection with Tubal Gestation.

If the death of the fœtus occur in the earlier weeks and the mother survive, the subsequent conditions will vary according as the embryo is retained in its envelopes or is cast out free into the abdominal cavity. In the latter case it may be quickly absorbed; in the former, absorption, although slower, is the usual ultimate result. Gestation which has advanced for several months may give rise to a variety of changes. The fœtus may undergo a process of mummification and remain encapsulated in the body of the mother for years. Chiari has reported a case in which the mummified fœtus was carried for fifty years. It may undergo calcareous degeneration, so-called, and become a lithopædion and remain in that state for years. The mummified or calcareous fœtus ordinarily gives little trouble; it may, however, become the seat of suppuration, and as a consequence the patient may succumb to exhaustion from peritonitis or blood-poisoning. On the other hand, spontaneous opening of the abscess into the intestines, vagina, or through the abdominal walls may lead to recovery. A lithopædion has been the mechanical cause of obstruction in labor. The formation of a uterine decidua and its discharge in tubal pregnancy has been already mentioned. The musculature of the uterus also undergoes hypertrophy. The organ may enlarge to the size of the fourth month of pregnancy, and then to some extent diminish. If the tubal pregnancy is interrupted by abortion or rupture, the uterus generally at the same time throws off the decidua with a bloody discharge. This spurious labor may, however, occur at any time, and always does occur at some time in the course of the gestation.<sup>1</sup>

### Symptoms.

To some extent the symptoms of tubal pregnancy have already been indicated. In some cases the menstruation is uninterrupted. The usual signs of pregnancy, such as pigmentation, fulness of the breasts,

<sup>1</sup> For a full description of the microscopic character of the fetal envelope, the uterine decidua, and the minute changes in the gestation-sac, and for a more extended account of the degenerative changes that occur in connection with tubal gestation, the reader is referred to the most recent and complete works on this subject, those of August Martin and Webster and Bland Sutton.

and morning sickness, may be present or absent. Frankenthal<sup>1</sup> says that during the first eight weeks the ordinary subjective signs are absent. This statement, for the majority of cases, is true. Slight uterine hemorrhages may occur at irregular intervals from the beginning. Colicky pains, probably due to uterine contractions, appear toward the end of the second month, and are apt to continue at irregular intervals throughout the whole period of gestation. The signs of interstitial pregnancy are much like those of normal uterine gestation. This is explained by the nearness of the gestation-sac to the endometrium.

When tubal pregnancy goes on beyond the fourth month the external sign of asymmetrical enlargement in the abdomen begins to appear. The pressure symptoms are much like those of uterine pregnancy. In tubo-ligamentous pregnancy there is exaggerated pressure on the pelvic organs. Finally the usual signs of foetal life are present, and, in the latter months of tubal pregnancy, painful foetal movements are common.

The pains of the spurious labor resemble those of normal parturition and are sometimes very deceptive. They may be slight or severe. Cases are recorded in which they have continued for days and even weeks, or have recurred irregularly for long periods. One or two cases have been reported at which the sac ruptured into the vagina at the time of spurious labor and the child was produced in the natural way. Rupture into the intestine and expulsion of the foetus through the bowel has been reported. This could occur only in the earlier weeks.

*Pelvic Hæmatocele.* The symptoms of tubal abortion and rupture are those of pelvic hæmatocele. The relations of hæmatocele to tubal gestation are most significant; the former has been defined as an accumulation of blood in the pelvis proceeding from rupture of a pelvic vessel; in the vast majority of cases, at least, it is due to tubal abortion or rupture. There are no premonitory signs. Small hemorrhages may give rise to no marked subjective symptoms; even large accumulations of blood, if free in the peritoneal cavity, may cause little or no pain. When the blood is poured out into confined spaces, such as the space between the folds of the broad ligaments, the subjective symptoms which are due to the tearing of the parts are distressing and overwhelming.

There is sudden and excruciating pain all over the abdomen, and especially about the pelvis; then come nausea, vomiting of bile, cold extremities, skin bathed in cold sweat, features pinched, rapid and weak pulse, tenesmus, and irritability. In serious cases the shock will be as great as in Asiatic cholera; the pain outbalances every other symptom. The tissues are being literally torn asunder. The impression of such a scene is not readily effaced from the memory. As the woman tosses to and fro in the agony of excruciating pain and stains the bedclothing with vomit there will be the extreme suffering, the bloodless, pinched features, the bloodshot eyes starting from their sockets, twitching of the facial muscles, and clinching of the fingers. As Emmet has graphically described the condition, at one moment the

<sup>1</sup> Transactions Chicago Gynecological Society, p. 239.



woman will utter the most piercing single shriek and then bear down as if she would drive the contents of her body from her. These symptoms may subside and convalescence may be established, with absorption of the clot, or fresh hemorrhage, with even more profound collapse, or death, may suddenly occur.<sup>1</sup>

The symptoms are much more pronounced in tubal rupture than in tubal abortion. If the abortion is complete, that is, if the ovum and its envelopes are completely thrown out, the hemorrhage may be comparatively slight, be walled in by adhesions, and slow recovery take place. This is what occurs in many cases of pelvic hæmatocele that recover without operation. Such results are probably more common in the very early stages of tubal gestation than is generally supposed. In fact, many cases are for this reason unrecognized. There is, indeed, a possibility of moderate and gradual hemorrhage without any pronounced symptoms. In a very large proportion of cases, however, the abortion is incomplete, and a portion of the ovum or its envelopes is left attached. Repeated hemorrhages, with severe abdominal pain, may, after days or weeks of suffering, unless relieved by operation, end in final collapse. If the progress of the case is more rapid the symptoms closely resemble those of intestinal or gastric perforation and excessive hemorrhage combined. Hæmatocele may at first be unrecognized. If the bleeding be extensive the early sense of fulness on percussion and palpation gives way later to the localized signs of a concentrated clot.

As already stated, hemorrhage into the space between the folds of the broad ligaments is confined, and therefore limited. If the force is sufficiently strong to cause secondary intraperitoneal rupture, that is, rupture from the interior of the ligament to the peritoneum, there will be great danger of profound acute anæmia and collapse. If the blood is confined the vesical and rectal tenesmus and other symptoms due to tearing and pressure may be overwhelming.

### Diagnosis.

In the early period of tubal pregnancy there are no certain means of diagnosis. The patient may have noticed no irregularity in her physiological life, and may have been utterly unaware of her condition until the occurrence of rupture or abortion. This is especially likely to be the case when the abortion or rupture occurs very early after impregnation. Usually, however, it occurs between the fourth and ninth weeks; during this time certain anomalies already mentioned, such as irregular menstruation or pain, may have attracted attention and led to discovery of an enlarged tube. It is a significant fact in diagnosis that tubal pregnancy often occurs after long periods of sterility. Such sterility is therefore a suspicious fact. The microscopic finding of the cast-off decidua is, of course, strongly diagnostic. In the later periods of gestation many of the usual signs of pregnancy are modified and distorted by the abnormal conditions.

<sup>1</sup> Adaptation from Emmet.

## Differential Diagnosis.

The following conditions may simulate or coexist with tubal pregnancy: Spurious pregnancy. Certain conditions of abnormally thin uterine walls, together with displacement of the uterus. Normal pregnancy, with the uterus in position. Normal pregnancy in a retroflexed or lateroflexed uterus. Ovarian and other tumors.

Pregnancy in the rudimentary horn of a uterus unicornis, though of different pathology, is subject to the same laws of diagnosis and treatment as ordinary tubal pregnancy.

Tubal gestation in the fully developed horn of a bicornate uterus may be mistaken for ectopic pregnancy. Such a pregnancy would go on to normal delivery at term. Correct diagnosis in such a case may prevent an unnecessary abdominal section, and is therefore most important.

The differential diagnosis of tubal abortion and rupture is with the following conditions:

Rupture of a sactosalpinx.

Rupture of an aneurism.

Rupture of an ovarian tumor.

Appendicitis, with rupture of the appendix.

Perforation of the stomach or intestine.

Hæmatocele from causes not dependent upon tubal gestation.

None of the above-named conditions, however, produce the symptom-group outlined in the above remarks on diagnosis.

## Prognosis.

This is always doubtful and serious. Spontaneous recovery is, however, not uncommon. In former times pelvic hæmatocele was not, in the majority of cases, recognized as being tubal pregnancy, and was therefore usually treated on the expectant plan. Under such conditions spontaneous cures were frequent. Our knowledge of the true pathology and the consequent greater frequency of operative interference does not change the fact that spontaneous recovery will often occur just the same, even though the name of the condition has been changed from hæmatocele to tubal pregnancy. However, recovery occurs much more frequently with than without operation. In two hundred and seventy-eight cases for which there had been no operation, collected by Schauta, Martin, and Ortman, one hundred and eighty-seven, or a little over two-thirds, died; while five hundred and seven, or 80 per cent. of six hundred and thirty-six cases operated upon, survived.<sup>1</sup>

## Treatment.

From the observations already made, the proposition follows that the treatment of tubal pregnancy will, as a general rule, be operative. The safety of the patient is immeasurably greater if the diagnosis is

<sup>1</sup> A. Martin. *Krankheiten der Eileiter*, 1895, p. 384.

made and the operation performed in the earlier weeks, before the time of tubal abortion or rupture. Unfortunately for the great majority of cases, the first intimation of the diagnosis comes with one or the other of these accidents.

The treatment will vary according to the following conditions:

1. The diagnosis has been made before the time of rupture or abortion.

2. Rupture or abortion has just occurred.

3. The patient has survived the immediate effects of rupture or abortion, and gestation has ceased with the death of the foetus.

4. Rupture has occurred, but the foetus is alive and gestation is still going on.

1. *Treatment before Rupture or Abortion.* The tube and its contents should be immediately removed. Only by this means can the woman be protected against the extreme peril of continued tubal gestation. The danger of the operation is not greater than the removal of the uterine appendages under other circumstances, and its technique is the same. In very many cases tubal pregnancy is unrecognized until the abdomen has been opened on the diagnosis of a supposed hydrosalpinx or pyosalpinx. This fact, as Penrose says, emphasizes the value of the rule to operate for all gross lesions of the tube.

2. *Treatment Immediately after Rupture or Abortion.* The general rule is to operate without delay. It may be unwise to wait for reaction from the shock and hemorrhage, for hemorrhage is the very indication for interference. Indeed, the immediate object of the operation is to stop the hemorrhage.

The writer has recorded two cases in which the patients were in apparent collapse, and for this reason it was not deemed wise to operate unless there should be a tendency to rally. In both cases there was slow improvement and final recovery without operation. A few months later in both cases the products of conception had entirely disappeared by absorption. These cases show that without operation the prognosis, even in the most extreme conditions, is not hopeless. The operation is as follows:

The abdomen is opened as for the removal of the uterine appendages. The tube and, together with it, the broad ligament are grasped and pulled into the wound; two strong pairs of hæmostatic forceps are placed on the broad ligament, one on the infundibulo-pelvic extension of it, near the pelvic wall, the other close to the uterus; this will control the ovarian artery both at its point of entrance to the ligament and to the uterus. Ligatures are immediately substituted for the forceps, the tube removed and hæmostasis secured as described on pages 248 to 253. If there is a cavity between the folds of the broad ligament it may be obliterated by fine buried catgut sutures.

The free infusion of normal salt solution, two or more pints, by hypodermoclysm, preferably under the breasts, is strongly indicated. This infusion, which may be given according to the indication before, during, and after the operation, has turned the scale for recovery in many a desperate case. If the hemorrhage has been great, Frankenthal advises direct transfusion of blood.



There is apparent merit in the suggestion<sup>1</sup> to place the patient in the Trendelenburg position in order that the blood may be distributed over larger peritoneal surfaces, and, therefore, have better chance for absorption. The object is to avoid shock, localized hæmatocele, and possibly operation.

3. *If rupture or abortion has occurred*, and the patient has recovered from its immediate effects, and gestation has ceased with the death of the fœtus, there may be spontaneous cure, with absorption and disappearance of the products of conception. Under these favorable conditions, especially if there be continuous gradual improvement in the symptoms, one may adopt the plan of watchful expectancy. Frankenthal says: "Treat conservatively only those cases seen some time after primary rupture when you are reasonably certain of the death of the fœtus and when the alarming symptoms have subsided, and when, presumably, absorption is going on." Intraligamentous rupture occurring within the first three or four weeks of gestation is rather liable to be followed by recovery and absorption. One must, however, be prepared to operate promptly upon the least evidence of secondary rupture and hemorrhage or upon the onset of infection. Even in this class of cases, however, it is permissible and possibly safer to operate, and thereby relieve the woman of the danger incident to the presence of a dead fœtus in the pelvis.

Previous to the fourth or fifth month the entire gestation-sac and its contents may be usually removed without great danger of fatal hemorrhage. At least the hemorrhage, if troublesome, may be controlled by ligature of the ovarian vessels, or, if necessary, of the ovarian and uterine vessels. After the fœtus has been dead for some time there is little or no danger of hemorrhage in separating the placenta.

4. *If gestation has advanced beyond the fourth or fifth month*, and the child is living, the removal of the fœtus, together with the placenta and gestation-sac, is practicable in only a small minority of cases, and then only in the hands of the experienced and expert operator. The conditions favorable for this radical operation are found in the rare pedunculated tubal pregnancies already mentioned, in which gestation may go to term without rupture, and in other rare cases in which the sac can be isolated, brought through the wound, and a pedicle formed, or its attachments separated without excessive hemorrhage. Ligature of the ovarian and uterine vessels does not control the terrible hemorrhage which at this period and under ordinary conditions invariably follows separation of the placenta. The surgeon must assume the great responsibility of a decision, when the abdomen is open, whether or not he will attempt the removal of the gestation-sac. The deliberate attempt to remove it has many times resulted in uncontrollable and fatal hemorrhage. In opening the sac one may accidentally incise or partly separate the placenta and find himself face to face with a most formidable if not unmanageable hemorrhage. Compression of the aorta and ligature of the uterine and ovarian arteries, if promptly

<sup>1</sup> Sippel. Centralblatt für Gynäkologie, 1896.

and skilfully executed, may or may not save the patient's life. In the vast majority of cases in which gestation is in progress beyond the fourth or fifth month the operator must be content to incise the sac, remove the foetus, stitch the sac to the abdominal wound, and leave the placenta. Bland Sutton proposes, instead of stitching the sac to the wound, to close it with sutures. This is done in the hope that the placenta will undergo atrophy or absorption. The danger of infection in a sac thus closed would be considerable. The more usual and safer plan, therefore, is to leave the placenta and establish gauze or tubular drainage. After two or three weeks, when the placental circulation has ceased, the wound may be reopened, the gauze removed, and the placenta taken away. Another more common and approved practice is to let the placenta disintegrate and drain away as débris.

Some operators prefer to delay operation until after term, when the child has died and the placental circulation has ceased. The products of conception may then be removed entire, with the minimum danger of hemorrhage. This plan necessarily involves the dangers incident to the continued presence of an extra-uterine foetus.

*The Abdominal Versus the Vaginal Route.* If the products of conception are low down and quite accessible, and if gestation has not passed beyond the eighth week,<sup>1</sup> and the tube is movable so that it can readily be brought out through the vaginal wound, it is permissible to operate by that route. If the gestation-sac is between the folds of the broad ligament and the child has been for some time dead, and the placental circulation has therefore ceased, one may remove the products of conception, unless too large, through the vagina. In all other cases the difficulty of controlling hemorrhage through the vagina is too great and the abdominal route is therefore preferred. The difficulty of ligaturing the infundibulo-pelvic ligament through the vagina is an objection to that route.

In all cases of ectopic pregnancy at term the viability of the child as compared to the life and welfare of the mother is a very secondary matter. Few children are produced alive, and fewer still survive many days. The few who do survive are physically and mentally inferior. Harris<sup>2</sup> collected a number of cases of living children of extra-uterine pregnancies, and in 1895 reported to Orthman that of fifty-seven whose histories he had been able to trace only five survived their second year.

<sup>1</sup> Frankenthal. Transactions Chicago Gynecological Society, 1896.

<sup>2</sup> American Journal of the Medical Sciences, August, September, 1888.

## CHAPTER XXXVII.

## CONGENITAL MALFORMATIONS.

MALFORMATIONS may be due to arrested development or to excessive development. In the first class of anomalies we have those malformations which are due to the persistence of embryonal conditions; the second class includes the hypertrophies and multiplications of otherwise normal organs and tissues.

The genital organs in the foetus first appear in a structure called the genital eminence, which lies on each side of the median line and subdivides later, the inner portion forming the sexual gland—the testicle in the male and the ovary in the female—while the outer section becomes the Wolffian ducts and bodies and the canals of Müller. In the female embryo at term the Wolffian bodies, which had served the function of the kidney during embryonal life, atrophy and become the body of Rosenmüller, while the ducts of Müller in their upper portion form the tubes, and in their lower portion coalesce with the Wolffian ducts to produce the uterus and vagina. It is essential to keep these facts in mind in considering the genital malformations due to arrest or excess of development.

## Malformations of the Ovaries.

Malformations of the ovaries are not numerous. They consist mainly in lack of development or in excessive development. The principal anomalies are these:

Accessory or constricted ovaries.

Supernumerary ovaries.

Absence of the ovaries.

Rudimentary ovaries.

Congenital hypertrophy of the ovaries.

Congenital displacement of the ovaries.

**Accessory Ovaries** are found in from 2 to 3 per cent. of autopsies. They are always of small size, and are usually connected with the normal ovaries by a pedunculated or sessile attachment. Two or three may be found in one case. They are usually parts of the original ovary separated during late foetal life by the constriction of peritonic bands. The ovary may be thus divided into two equal halves or may be only partially divided. The presence of accessory ovaries may account for pregnancy after both ovaries are supposed to have been removed.

**Supernumerary Ovaries.** Only one authentic case has been reported.<sup>1</sup> This was a third ovary situated in front of the uterus in direct relation with the bladder and connected to the uterus by a strong

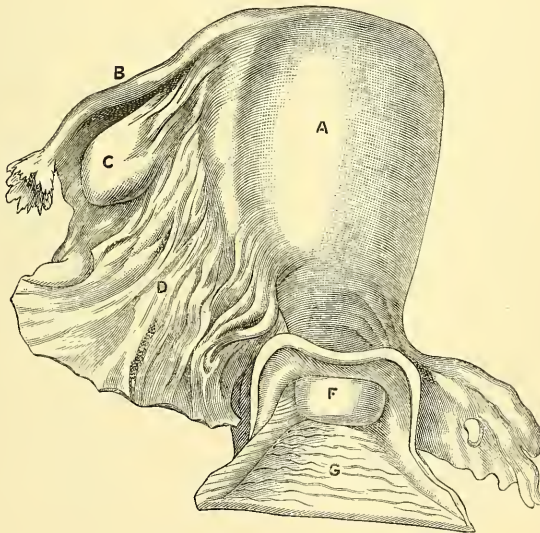
<sup>1</sup> Winckel, in Allbutt and Playfair, *System of Gynecology*.



ovarian ligament. This ovary was twice the normal size. The two other ovaries were of equal size. There was no trace of peritonitis in the neighborhood.

Absence of the Ovaries is a rare condition. It is usually associated with imperfect development or absence of one or more of the other sexual organs. An absolute diagnosis can be made only by autopsy, for the ovary may be present in an abnormal location or in a partially developed state, and is therefore easily overlooked. Absence of one ovary is apt to be associated with absence of the corresponding half of the uterus and Fallopian tube. The writer has, however, in one case operated for the removal of the suppurating right tube and ovary, and found a perfectly developed uterus and, so far as could be discovered, entire absence of the left tube and ovary. There was only a slight protuberance at the left uterine cornu to mark the point where the tube should have originated.

FIGURE 231.



Absence of the left ovary, with full development of the other genital organs. This would be a good illustration of the author's case. A. Corpus uteri. B. Fallopian tube. C. Ovary. D. Broad ligament. F. Cervix uteri. G. Vagina.<sup>1</sup>

Rudimentary Ovaries are not very uncommon. They are of small size, and the Graafian follicles are absent or rudimentary. The uterus may be normal or may be also rudimentary.

Congenital Hypertrophy of the Ovaries. Excessive growth of the ovary has been recorded, but this cannot be strictly classed as malformation. It has been attributed to hyperæmic or inflammatory conditions during foetal life.

Congenital Displacement of the Ovary. "Non-descent of an ovary is a rare but not unknown anomaly. Mr. Bland Sutton has

<sup>1</sup> A. Martin. Die Krankheiten der Eileiter.

reported a case in which the right ovary was adherent to the lower border of the kidney of the same side, and I have seen a case in the newborn infant in which it was attached by peritonitic bands to the cæcum. It has been stated that it may be found free in the peritoneal cavity." At least occurrences of this kind have been recorded. Sir Astley Cooper, for example, once transplanted the testicle of a cock to the abdominal cavity of a hen, where it continued to grow.

"Instead of non-descent, there may be dislocation of the ovaries downward into the inguinal canal. According to Puech, congenital inguinal hernia of the ovary is much more common than acquired, and Zinnis has recently reported an instance of it; but Bland Sutton states that he knows of no case in which the ovarian nature of the herniated body has been proved by microscopical examination conducted by a competent observer. Herniation of the ovary, which may be unilateral or bilateral, is usually associated with displacement of the Fallopian tube, and sometimes with malformation of the uterus and malposition of the kidney. It may be due to defective development of the round ligament and a patent condition of the canal of Nuck."<sup>1</sup>

*Clinical Significance of Ovarian Malformation.* The absence of one ovary, if the other is perfectly developed, does not render the woman sterile. On the contrary, her reproductive functions may be in no respect impaired. If both ovaries are rudimentary or absent, sterility is the rule. There is usually wanting in such cases the normal development at puberty; there will also be an associated faulty general nutrition, a weak nervous organization, chlorosis, and not uncommonly a growth of hair on the face, especially the upper lip. The individual may retain even the general physical characteristics of infancy and childhood, or there may be an apparently full development of the extra-pelvic organs.

*The diagnosis of ovarian malformations* is made by the above signs and symptoms and by the recognition on conjoined examination of undeveloped, absent, accessory, or otherwise anomalous ovaries. Early and accurate diagnosis is important, for only by this means will the woman be saved from a possible long-continued and useless treatment for sterility. It is often impossible to say that an apparently rudimentary ovary is congenital, for it may have been subject to atrophic changes consequent upon the acute infectious diseases of childhood.

#### Malformations of the Fallopian Tubes.

These malformations are analogous to those of the ovary, and are therefore as follows:

Supernumerary tubes.

Accessory tubes and ostia.

Increased length and excessive convolution.

Rudimentary development.

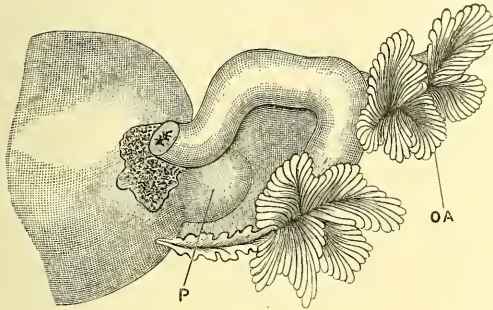
Absence of the tubes.

Supernumerary Tubes are rare. They may be associated with supernumerary ovaries. Only a few cases have been recorded.

<sup>1</sup> Quoted from Allbutt and Playfair, System of Gynecology.

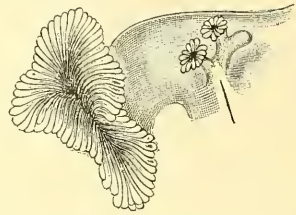
Accessory Tubes and Ostia are not uncommon. As many as six accessory ostia have been observed in one tube. The anomaly has no definitely recognized significance.

FIGURE 232.



Tube with accessory ostium. CA. Accessory ostium.  
P. Small intra-ligamentous cyst.<sup>1</sup>

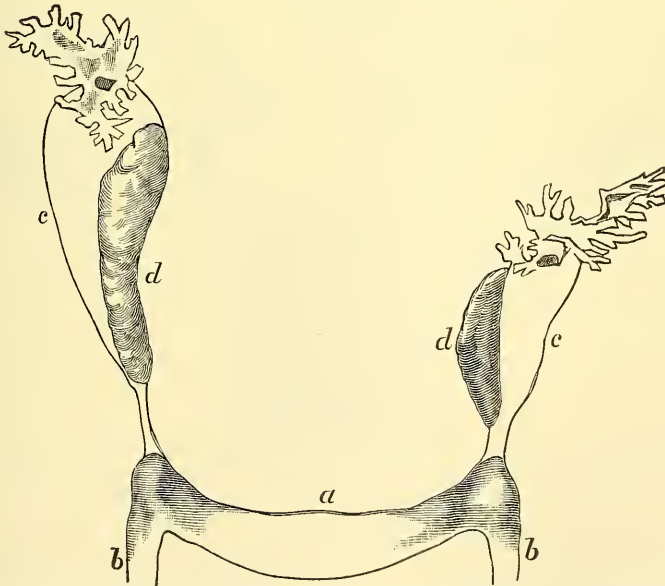
FIGURE 233.



Tube with accessory tube and ostium.<sup>2</sup>

Increased Length and Excessive Convolution of the tubes have been said to favor tubal pregnancy. Their cause is unknown.

FIGURE 234.



a. Ribbon-shaped rudiment of the uterus. b, b. Round ligaments. c, c. Fallopian tubes.  
d, d. Ovaries.<sup>3</sup>

**Rudimentary Development.** The rudimentary tube is usually imperforate, being a mere fibrous cord with, perhaps, the semblance of

<sup>1</sup> After Kossman, in A. Martin. Die Krankheiten der Eileiter.

<sup>3</sup> From Kussmaul and Nega. Mann's American System of Gynecology.

<sup>2</sup> Ibid.



an open ampulla and fimbriæ. The corresponding ovary may or may not be also rudimentary or absent. The accident is due to failure of development of Müller's duct.

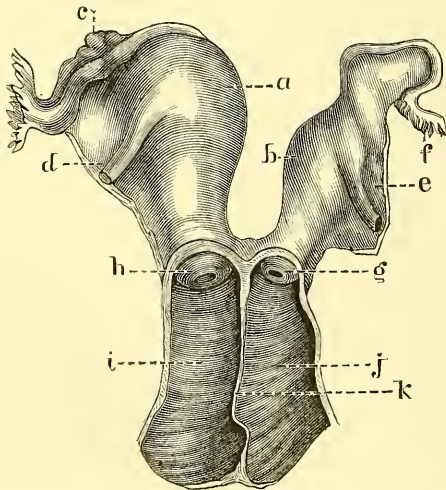
Absence of the Tube more frequently pertains to one than to both sides. When both tubes are absent the uterus and ovaries are also usually wanting. Cases have been recorded in which the tube and kidney on the same side were absent. Absence of one tube is usually associated with want of development of the corresponding side of the uterus—that is, with *uterus unicornis*.

The *Clinical Significance* of malformations of the tubes is much the same as that already outlined for malformations of the ovaries.

### Malformations of the Uterus.

The developmental defects of the uterus form a large proportion of the genital malformations. They have been elaborately studied and classified, but for the most part may be ranged under two general heads. 1. Those due to imperfect development of Müller's ducts. 2. Those due to imperfect blending of the same.

FIGURE 235.



Double uterus, uterus didelphys. *a.* Right cavity. *b.* Left cavity. *c.* Right ovary. *d.* Right round ligament. *e.* Left round ligament. *f.* Left tube. *g.* Left vaginal portion. *h.* Right vaginal portion. *i.* Right vagina. *j.* Left vagina. *k.* Partition between the two vaginæ.<sup>1</sup>

**Infantile Uterus.** If the Müllerian ducts unite but do not continue to develop, the result will be an undeveloped, infantile, or foetal uterus. If the arrest of development occurs very early in foetal life, the uterus will be extremely rudimentary. It may consist of an infantile cervix, and, in place of the corpus, only a fibrous cord extending from the site of one Fallopian opening to the other. If the arrest of development did not occur until after birth, the uterus will be smaller than normal,

<sup>1</sup> From De Sinéty and Ollivier, in American System of Gynecology.

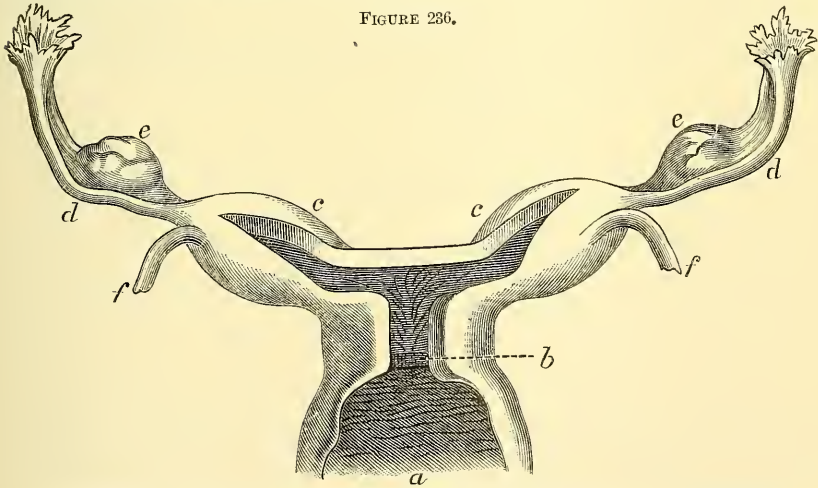
but in other respects not strikingly different from the fully developed organ.

The anomalies due to defective blending of Müller's ducts are numerous and frequent. Nearly every degree of imperfect fusion has been observed. The following anomalies are all due to this cause.

**Double Uterus.** The most extreme anomaly due to defective blending is the double uterus (uterus didelphys), in which there are two complete organs lying side by side, each Müllerian duct having formed a perfect uterus with cervix and fundus, but with only one cornu, one Fallopian tube, and one round ligament. Either of these uteri may be functionally competent. Pregnancy and parturition may therefore proceed normally. On the other hand, one may be rudimentary or imperforate. If the imperforate organ is functionally active, it may become distended with menstrual blood and form hæmatometra. This will require surgical interference.

**Accessory Uterus.** A very curious and rare malformation is the uterus accessorius. In this condition, besides the normal uterus, there exists another uterus anteriorly, between it and the bladder. In one case a third uterine lobe was found attached to the single cervix of a bifid uterus. It is hard to account for these anomalies. The assumption has been made that the accessory organ was developed from a diverticulum of a Müller's duct.

FIGURE 236.



Uterus bicornis unicellis. a. Vagina, laid open. b. Single cervix. c, c. Uterine horns. f, f. Round ligaments. d, d. Fallopian tubes. e, e. Ovaries.<sup>1</sup>

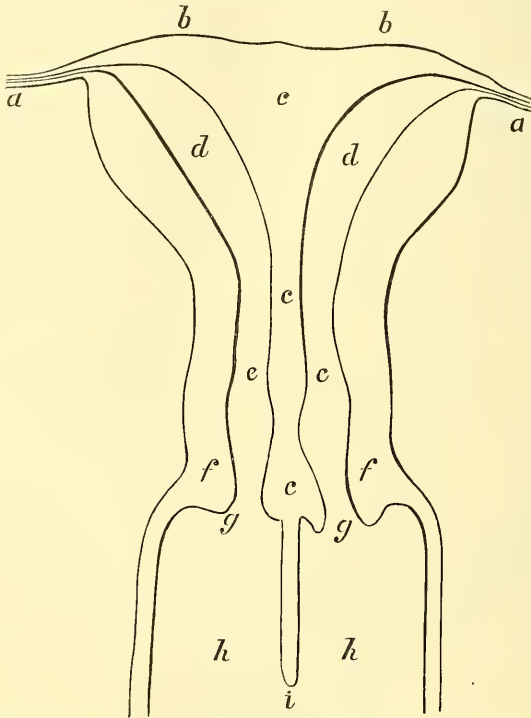
**Bicornate Uterus.** Next in importance to the double uterus is the much more frequent bicornate uterus, in which the fusion of the Müller's ducts has occurred lower down than normally, with the result of producing a Y-shaped organ. This deformity occurs in all degrees. In one extreme, the septum extends the whole length of the cervix and gives rise to a double os externum.

<sup>1</sup> From Kussmaul, in Mann's American System of Gynecology.

In the other extreme the two cornua may be separated only by a notch at the fundus (uterus cordiformis).

**Uterus Septus.** In this anomaly there is complete division of the uterus into two cavities by an antero-posterior vertical partition or septum. Uterus subseptus signifies an imperfect septum and consequent partial division. This is not indicated by the external appearance of the organ. The septum may be complete or incomplete, or it may form only a ridge on the interior of the uterus. It may even extend through the cervix, or it may be confined to the cervix or to the corpus.

FIGURE 237.



Uterus septus duplex (natural size), completely double uterus and incompletely double vagina of a girl twenty-two years of age. *a, a*. Tubes. *b, b*. Fundus of the double uterus. *c, c, c*. Partition of uterus. *d, d*. Cavities of the uterine bodies. *e, e*. Internal orifices. *f, f*. External walls of the two necks. *g, g*. External orifices. *h, h*. Vaginal canals. *i*. Partition which divided the upper third of the vagina into two halves.<sup>1</sup>

There may be, in fact, every possible variety in the situation or completeness of the septum. The typical, if not the commonest form has two lateral cavities involving both body and cervix. The bicornate and septate uteri have a similar clinical significance. In either there is liable to be an imperforate condition of one side of the septum or the other, with resulting hæmatometra. Pregnancy occurring in one of the horns of a bicornate uterus, especially if a septum also exists,

<sup>1</sup> Kussmaul. Mann's American System of Gynecology.

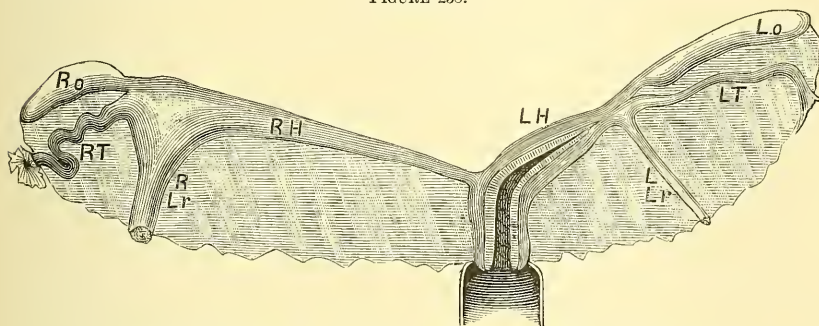


may give rise to the difficulties and dangers of a tubal gestation. Menstruation is liable to be frequent and otherwise abnormal, and parturition to be embarrassed. In a subseptate uterus malpresentations are prone to occur and the insertion of the placenta to be abnormal.

We have in the above varieties a complete gradation between the double uterus, on the one hand, and the uterus septus on the other. The relative dimensions of the two horns may vary to the extent of complete absence of one, and consequent uterus unicornis.

**Uterus Unicornis.** When only one horn of the uterus is well developed, or only one exists, we have the single-horned uterus, or uterus unicornis. There is here failure of fusion and more or less atrophy of the duct on one side. The kidney, ureter, ligaments, tube, and ovary on the side of the lacking or imperfect cornu are also, as a rule, rudimentary or absent. The rudimentary horn may be hollow or solid; if the former, its cavity may or may not connect with that of the devel-

FIGURE 238.



Uterus unicornis. LH. Left horn. LT. Left tube. L.o. Left ovary. RH. Right horn. RT. Right tube. Ro. Right ovary. RLr. Right round ligament. LLr. Left round ligament.<sup>1</sup>

oped horn. If menstruation takes place in the closed horn there will be hæmatometra, and the normal progress of menstruation on the other side will lead to confusion in the diagnosis. Bilateral hæmatometra, both horns being imperforate, would give rise to less difficulty in the diagnosis.

Among the less important anomalies of the uterus are the following :  
Defect or absence of the vaginal portion of the cervix.

Septate os externum, with no trace of septum above.

Normal development on one side and defective development on the other; this would be an approach to a unicornate uterus.

Flat or arched fundus.

Congenital prolapse, retroversion, retroflexion, or antelexion.

Congenital communication between the endometrium and intestines or bladder.

In a remarkable case one side of the bipartite uterus is said to have developed on the exterior of the body.

**Premature Development of the Uterus.** This is usually associated with the same precocity in the other genital organs. Young girls

<sup>1</sup> From Schroeder. American System of Gynecology.

may thus menstruate at a very early age and show the sexual development of mature years.

### Malformations of the Vagina.

The vagina, in common with the uterus, is formed by the coalescence of Müller's ducts, and therefore shares largely in the malformations of that organ. Thus the double uterus and the uterus septus are commonly associated with double vagina.

The congenital anomalies of the vagina are these:

Vagina septa.

Absence of the vagina.

Atresia of the vagina.

**Vagina Septa.** A completely double vagina having two canals, each opening into an external vulva of its own, is very rare, only one case, that of Katharin Kaufmann, having been reported. In this case<sup>1</sup> the pelvis was divided into two lateral cavities by a peritoneal fold; each half contained a bladder, a unicornate uterus, an ovary, a Fallopian tube, and a rectum. The spinal cord was bifurcated at the level of the third lumbar vertebra.

The ordinary and much more common double or septate vagina is divided into two passages by a septum above the vulva. The hymen may have one or two openings, and the septum, as in the uterus, may be complete or partial.

When the uterus is double the vagina is also double, but in some cases the vagina is double and the uterus single, with the os externum then opening into one side of the double vagina. The other side ends in a cul-de-sac. If, under these conditions, the blind passage be alone used for coition, sterility will result. In other cases both septa may be in communication with the uterus. The septum may be so imperfect as to constitute only a ridge along the posterior and anterior walls of the vagina.

The septum seldom divides the passage into two exactly equal halves. Coitus is usually confined to one side. In case of uterus unicornis the vagina may be very small—in fact, of only half size. This is because one of Müller's ducts has failed in development from the uterus down, and the other has developed only on its own side, producing a unilateral vagina. In case of double uterus, or uterus septus or uterus bicornis, one-half of the vagina may be imperforate, with resulting accumulation of menstrual blood in the uterus and vagina on that side. This is hæmatometra and hæmatocolpos.

Aside from the possibilities of sterility and hematocolpos, and from the uterine conditions which may be associated, a vaginal septum is not of itself a very serious matter. It may never be suspected until parturition, and even then the septum may be destroyed or pushed to one side by the passing child.

Complete Absence of the Vagina is usually associated with absence or defect of the ovaries, tubes, and uterus, and with a generally defective

<sup>1</sup> Reported by Suppinger. Allbutt and Playfair, System of Gynecology.

sexual organization. If, however, the defect is only in that part of Müller's ducts which forms the vagina, the uterus and tubes will be normally developed. Absence of the vagina will then lead after puberty to retention of the menstrual products and the necessity of making an artificial vaginal passage. This is indicated in order to give exit to retained menstrual fluid, and is permissible to establish the physiological integrity of the vagina. Impregnation and parturition have taken place through a vagina thus opened. This subject will be further considered in the next chapter.

Inflammatory Atresia of the Vagina must not be confounded with congenital absence of the organ. The former is the result of adhesive inflammations which may be congenital and involve the whole length of the passage, or it may be due to inflammation occurring in childhood or in adult life; see *Dissecting Vulvo-vaginitis*, page 165. In a case of adherent vaginal walls, the walls when separated will, wherever the inflammation has not been destructive, be lined with vaginal mucosa. In congenital absence of the vagina the mucosa has never developed. There is only connective tissue between the vesical and rectal walls.

The remaining vaginal anomalies are rare; they include diverticula and communications between the vagina and other organs, such as the rectum and urethra. These openings are dependent not upon defects of Müller's ducts, but rather upon foetal cloacal conditions, hereafter to be described.

#### Malformations of the Hymen.

The hymen is an organ of variable strength and form. It may be annular, notched, fimbriated, fenestrated, cribriform, crescentic, thick, thin, fragile, tough, or vascular. Some of these conditions are normal, others but slightly abnormal. Complete absence is extremely rare, if not unknown. Imperforation, so-called, is a condition usually due to closure of the end of a Müllerian duct, and is therefore in no sense an abnormal hymen.

The importance of these anomalous conditions varies. A rigid hymen makes coitus painful or impossible, a very vascular membrane may lead to temporary profuse hemorrhage, and imperforation gives rise to hæmatocolpos, or in extreme cases also to hæmatometra, and demands operative interference; see *Congenital Atresia of the Genital Tract*. A rigid hymen may, after marriage, require divulsion or incision.

#### Malformations of the Vulva and Anus.

This subject becomes relatively simple when we understand the embryological development of the vulva and anus. At the end of the sixth week of foetal life the tangible differentiation of sex begins and the developmental changes which then normally take place are shown in the five following figures:<sup>1</sup>

<sup>1</sup> After Schroeder. From Hart and Barbour, *Manual of Gynecology*.



The allantois which forms the bladder, the rectum, and the Müllerian ducts, which form the vagina, all communicate with a common cavity,

FIGURE 239.

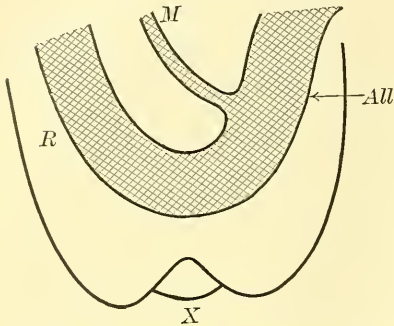


FIGURE 240.

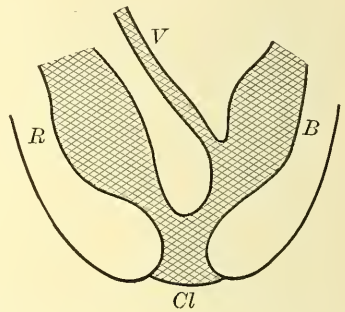


Figure 239.—*R.* Rectum, continuous with, *All*, allantois (bladder), and, *M*, duct of Müller (vagina). *X.* Depression of skin below genital prominence, which grows inward and forms vulva.

Figure 240.—The depression has extended inward and, becoming continuous with the rectum and allantois, forms the cloaca. *Cl.* Cloaca. *B.* Bladder.

FIGURE 241.

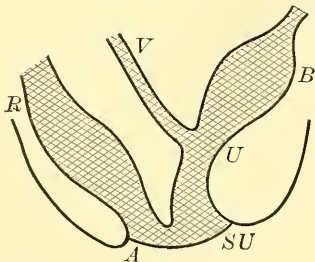


FIGURE 242.

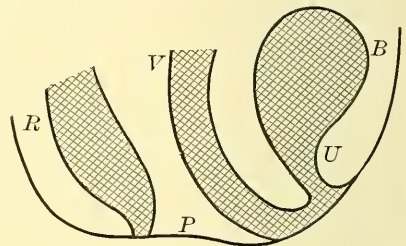
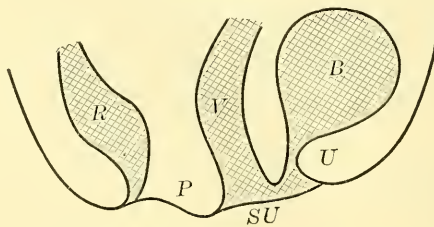


Figure 241.—The cloaca is becoming divided into the uro-genital sinus, *SU*, and anus, *A*, by the downward growth of the perineal septum. See also Figure 242.

Figure 242.—The perineum is completely formed. *P.* Perineum. The ducts of Müller have united into the vagina, *V*.

FIGURE 243.



The upper part of the uro-genital sinus has contracted into the urethra; the lower portion, *SU*, now becomes the vulva. *P.* Perineum. *R.* Rectum. *V.* Vagina. *B.* Bladder. *U.* Urethra.

but do not at this time open on the external surface. Presently there is a depression in the skin which opens inward to this cavity, and thus forms the cloaca. The cloacal opening is now divided into two parts

by a septum which later develops into the perineum. The posterior portion of the cloaca thus divided becomes the anus. The anterior part becomes the urogenital sinus. This sinus in its upper part becomes the urethra, and in its lower part the vulva.

The anomalies of the vulva and anus are :

Atresia.

Persistent cloaca.

Hypospadias.

Epispadias.

**Atresia of the Urethra, Vagina, and Anus.** The cloacal division by which the urethra, vagina, and anus are opened and thereby prolonged to the external surface may not take place. This will result in complete atresia of the vagina, urethra, and anus. The perineal septum may be absent, as shown in Figure 244, or present, as shown in Figure 245. In the latter case the opening between the rectum and the urogenital sinus will be closed. This condition of complete atresia has only been observed in stillborn foetal monstrosities. The bladder, urethra, and vagina—that is, the uro-genital sinus—are apt to be distended with urine.

FIGURE 244.

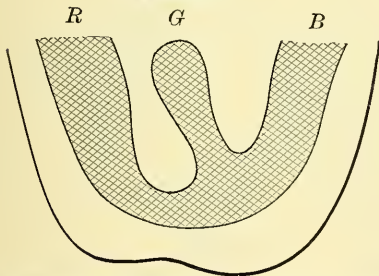


FIGURE 245.

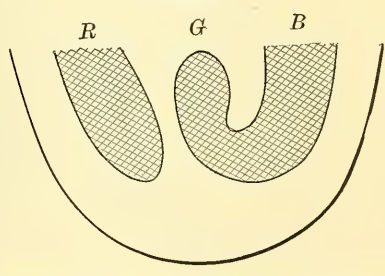


Figure 244.—Absence of cloacal division. Perineal septum wanting. R. Rectum. G. Genital canal. B. Bladder.

Figure 245.—Absence of cloacal division. Perineal septum present.<sup>1</sup>

*Congenital atresia* is not to be confounded with another form of vulvar atresia in which the labia have become adherent from inflammation. This may occur before or after birth. The adhesion is necessarily incomplete, otherwise the urine and menstrual fluid could not escape. The condition has been designated *superficial atresia of the vulva*; it is remediable by separating the labia, either by divulsion or by cautious dissection.

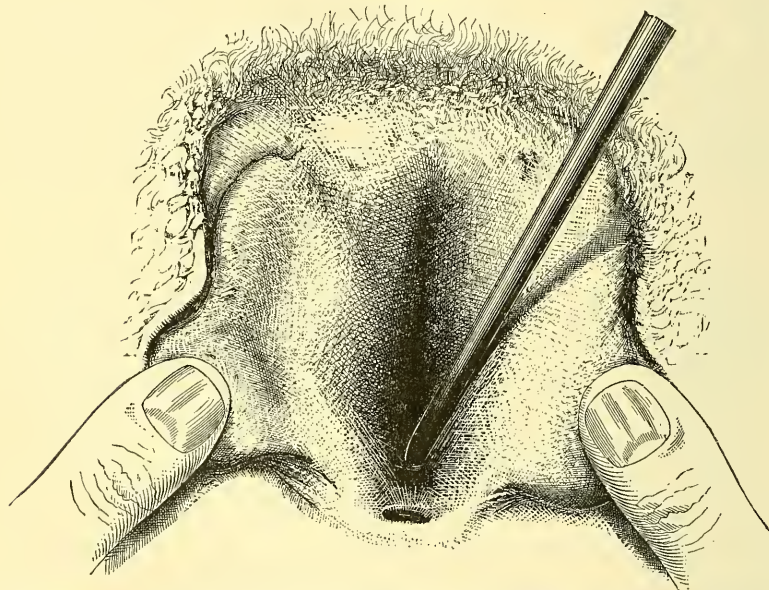
**Persistent Cloaca.** In this anomaly the anus practically opens directly into the vestibule; there is no perineum. The anomaly is a persistence of the condition in Figure 241. If the anal sphincter is also deficient the condition is a pitiable one. When there is control over the feces an operation may not be absolutely needed; but when there is incontinence of feces it is always advisable, and preferably before maturity. The usual operation has been to pass a probe into

<sup>1</sup> After Schroeder. From Pozzi, Treatise on Gynecology.

the fistula and out at the normal position of the anus, then split up the parts, draw the rectum downward and backward to the angle of the incision, suture it into position, and close the gap in front. A modification of this operation has been suggested by Buckmaster,<sup>1</sup> in which the new anus is made just in front of the levator ani muscle, and at a later period the fibres of this muscle are split to make a sphincter.

Hypospadias in the female is a defect in the posterior wall of the urethra, in extreme cases absence of the posterior wall. This makes a congenital vesico-vaginal fistula. It is a continuation of the foetal

FIGURE 246.



Hypospadias: congenital absence of the urethra. Sound passes from vagina directly into bladder. No retentive power.

condition in Figure 240, and is due to persistence of the uro-genital sinus. The lower portion of the allantois has partially or completely failed of development into a urethra. When the defect is only slight, there is control of urine; the anomaly is often associated with hypertrophy of the clitoris. Sometimes there may be a question as to the sex of the individual. In extreme hypospadias an effort may be made by a plastic operation to make an artificial urethra. The method of Emmet is shown in Figures 246 and 247.

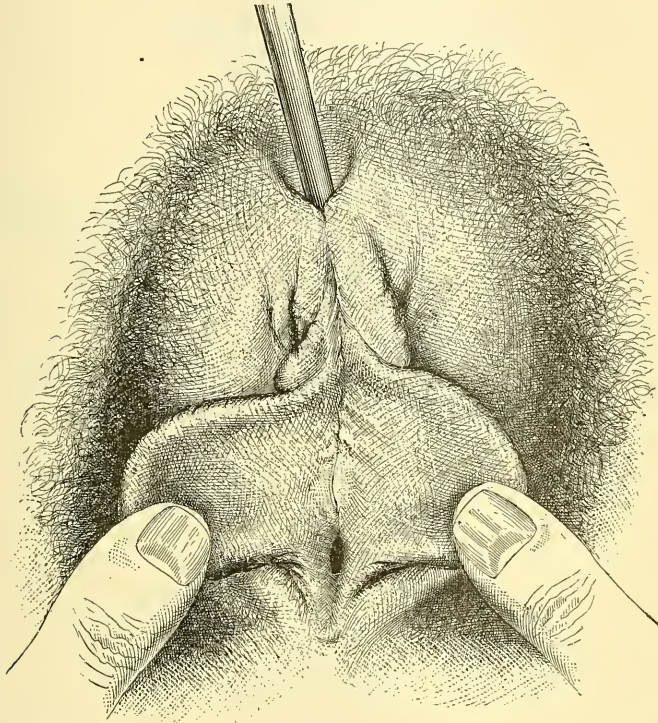
Epispadias in the female is generally accompanied with fissure of clitoris, and sometimes also of the symphysis and the whole anterior vesical wall. This gives rise to ectropion of the bladder. Incontinence of urine occurs even in the slighter forms, and an operation is

<sup>1</sup> Transactions American Gynecological Association, 1894, xix. p. 275.



required to restore the integrity of the bladder-wall. The labia are commonly absent in the extreme forms of epispadias.

FIGURE 247.



New urethra made after Emmet's method, by denuding and uniting two strips, one on either side of the urethral site.

#### Other Congenital Anomalies.

Among the other congenital anomalies may be mentioned:

General want of development of the vulva and absence of the labia majora and minora. This is called infantile vulva.

Hypertrophy of the labia.

Anomalies of the clitoris and its prepuce.

Infantile Vulva is commonly associated with defects of the internal genital organs and with a generally weak systemic development. It often coexists with chlorosis. It is not an absolute impediment to impregnation, but may be to parturition.

Hypertrophy of the Nymphæ is characteristic of the lower races, such as some of the African tribes. It is said also to be found frequently in connection with hypertrophy of the mammæ among the American Indians.

Anomalies of the Clitoris and its Prepuce. The clitoris will be recalled as that organ in the female which corresponds to the penis in the male. Hypertrophy of the clitoris may be congenital or acquired.

FIGURE 248.

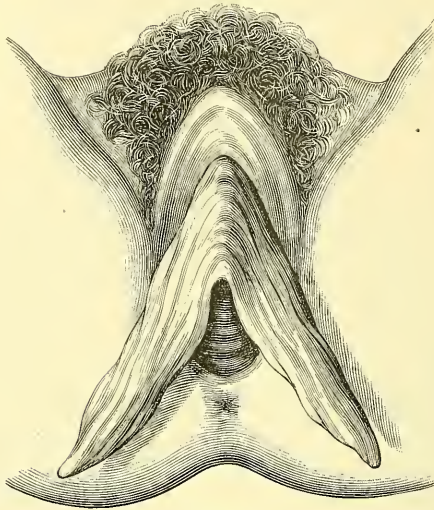
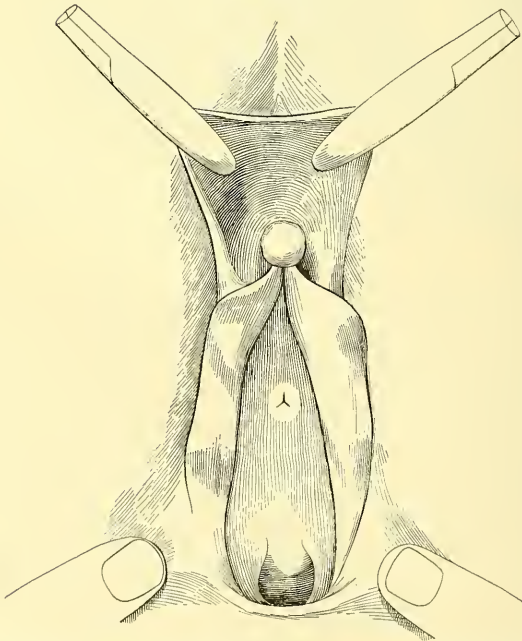
Hypertrophy of the nymphæ.<sup>1</sup>

FIGURE 249.



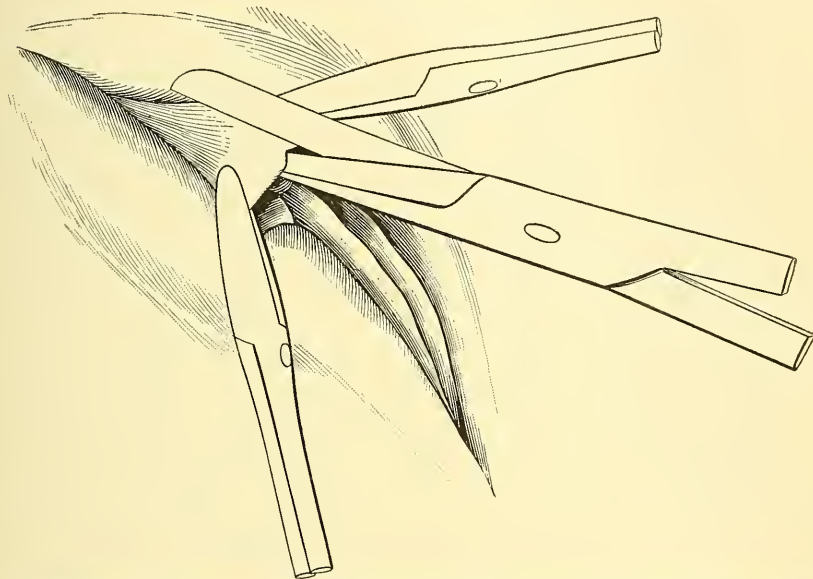
Redundancy of the prepuce and enlargement of the clitoris in a masturbating child of eleven.  
 Appearance of prepuce when put upon the stretch. Author's case.

<sup>1</sup> Bonnet and Petit. Gynecology

If congenital and associated with the malformations, such as pseudo-hermaphroditism, the enlargement may be so extreme as to have the appearance of a penis; it is common in the tropics; for congenital enlargement see Hermaphroditism.

Acquired hypertrophy is usually the result of masturbation in childhood; enlargement due to this cause is not extreme.

FIGURE 250.



Prepuce being divided on the dorsum of the clitoris, as would be done in a similar operation on the male. Same.

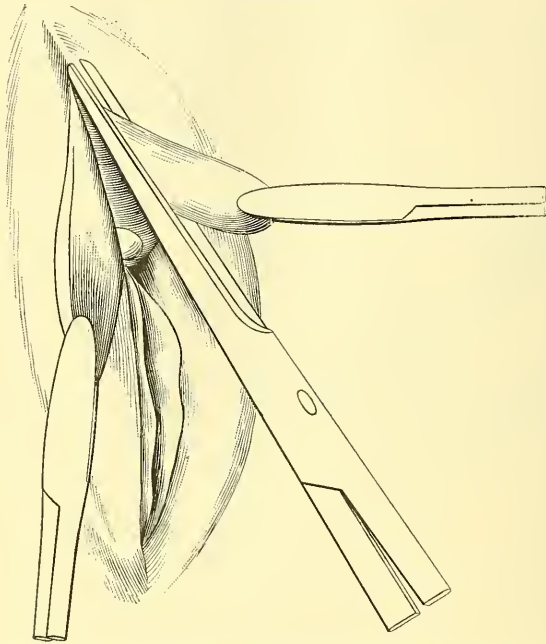
There is a class of cases occasionally observed among children in which the clitoris is moderately enlarged and surrounded by an abundance of loose, flabby, redundant preputial skin. In such cases the causes may be both congenital and acquired. The congenitally hypertrophied clitoris and redundant prepuce are, by reason of their size, unduly exposed to friction; this gives rise to irritation; the child instinctively rubs or scratches the part in order to obtain relief, and thus gradually forms the habit of masturbation. This frequent counter-irritation and consequent congestion are then in themselves additional causes of enlargement of the clitoris, and especially of redundancy of the prepuce. The child, unless relieved of the local irritation and taught to avoid all friction of the part, soon becomes a hopeless neurotic. The treatment in such a case is circumcision. The technique of the operation, which closely resembles that of circumcision in the male, is set forth in Figures 249, 250, 251, 252, and 253.

In the operation the same careful trimming of the loose, redundant skin is necessary as in circumcision of the male child. In suitable



cases the operation, if supplemented by positive and proper moral instruction and by judicious hygiene, is usually followed by a cure of

FIGURE 251.



Right side of the divided prepuce hanging loose, with forceps attached. Left side being removed with scissors. Same.

the unfortunate habit and by relief from the nervous symptoms. A most important factor in the general treatment is a non-nitrogenous diet, the avoidance of sweets, spices, highly seasoned food, tea, coffee, and stimulating drinks. The importance of hygienic living is self-evident. Such cases are rare.

*Adherent Prepuce.* This may be congenital or acquired. It produces the same reflex nervous symptoms as in the male, and requires the same treatment; that is, to separate the prepuce from the glans either by breaking up the adhesions or by incision. In some cases the indication, after loosening the adhesion, is to slit up the prepuce on the dorsum. If the prepuce is not so redundant as to require its removal, the wound may, as in the same operation for the male, be reunited by a line of union at right angles to the line of incision.

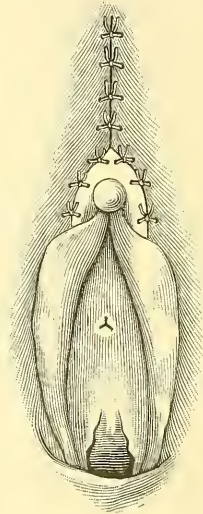
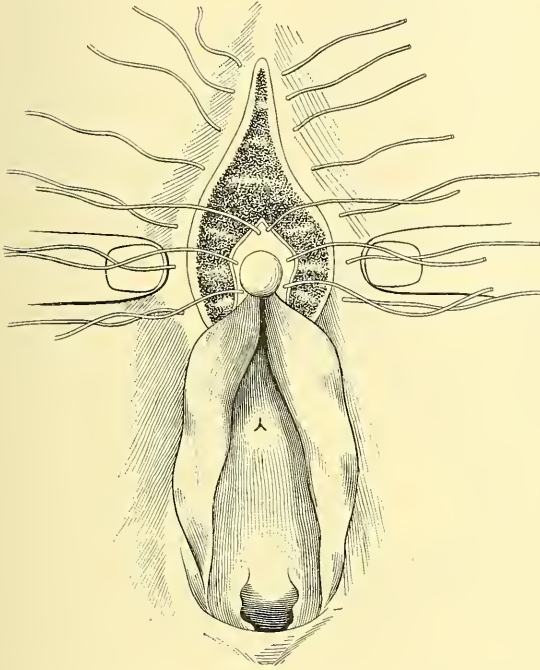
#### Hermaphroditism.

If we use the word hermaphroditism in its strict sense, to signify a combination of anatomically and functionally perfect male and female organs in one individual, a typical case has never been satisfactorily

established. The condition occurs sometimes in the higher, but more frequently in the lower vertebrates, and it is, perhaps, possible in man, but thus far has not been demonstrated by the necessary autopsy.

FIGURE 252.

FIGURE 253.



Redundant portion of prepuce all removed. Raw surfaces exposed and fine catgut sutures in place, ready to tie. Same.

Sutures tied and wound united. Same.

The cases of so-called hermaphroditism all, or nearly all, fall under the head of pseudo-hermaphroditism, in which there may be an irregular development of the sexual organs, some of the female, others of the male type, but with a decided predominance of one over the other. If the individual is really a female, and resembles the male, the malformation is called Gynandry. If the male resembles the female it is Androgyny.

Gynandry. There are two classes of cases.

In one class the breasts approach or conform to the male type. There may also be a hairy development on the face and a masculine voice, contour, and appearance. The genitalia are, however, present, and although, perhaps, rudimentary, are yet unmistakably of the female type. There may be congenital atresia of the vagina and infantile vulva, but the uterus and ovaries, partly or fully developed, are present.

In the other class of cases the hairy development and masculine

voice, contour, and appearance are supplemented by one or more of the following pronounced anomalies:

*a.* Pronounced hypertrophy of the clitoris, sometimes to the size and appearance of the fully developed penis.

*b.* The labia minora and majora may be fused together so as to obliterate the vulvar entrance.

*c.* Ovarian hernia and a consequent pouch may be present, resembling in form and situation a scrotum with its testicles. The uterus and ovaries are more or less perfectly developed.

**Androgyny.** Most of the cases of pseudo-hermaphroditism occur in individuals who have testicles, and are therefore essentially male. There are several forms of this class, of which three are given below.

FIGURE 254.



Pseudo-hermaphroditism by hypospadias (male). *T.* Testicles, not descended. *S.* Symphysis pubis. *C.* Undeveloped penis, resembling large clitoris. *B.* Bladder. *V.* Prostatic vesicle (pseudo-vagina). *R.* Rectum. The penis in this figure is drawn smaller than in the original.<sup>1</sup>

1. The mildest form is that in which the breasts approach or conform to the female type, and the penis and testicles are correct in form, but rudimentary.

2. An interesting subdivision of androgyny includes individuals whose generative organs are apparently female, except that they have testicles instead of ovaries, these glands being situated in the abdomen or in the inguinal canal, and the scrotum being absent. The clitoris, vulva, vagina, and uterus, more or less imperfectly developed, are present. Individuals belonging to this subdivision are usually brought up and pass as women throughout their lives.

<sup>1</sup> Swifel in Bonnet and Pettit, Gynecology.



3. The most numerous subdivision is that of hypospadiac men. There is an imperfect, diminutive penis held down by a bridle, and

FIGURE 255.

Pseudo-hermaphrodite by perineo-scrotal hypospadias.<sup>1</sup>

having the appearance of a large clitoris. The pendulous portion of this penis is imperforate. The hypospadiac urethral opening corresponds in situation and appearance to the female urethra. The testicles are usually in the abdomen or inguinal canal, and the scrotum is therefore wanting. There is a fissure in the median perineal raphe—a perineo-scrotal fissure. The development on either side of this fissure resembles the vulvar labia. These individuals have the female mammary development, and are usually brought up as girls, and in some instances have discovered the mistake only after marriage. Intercourse may be possible either in the prostatic vesicle, see Figure 254, or in the dilated urethra. Some of these monstrosities have been capable of coitus both as men and women.

The importance of hermaphroditism is obvious. As a clear diagnosis of sex in doubtful cases cannot always be made at birth, it is suggested that in cases of doubt the individual should be brought up as a boy. This course will cause less embarrassment, and in the vast majority of cases will prove to have been correct.

<sup>1</sup> From Bonnet and Petit, Gynecology. Modification.

The Treatment of Hermaphroditism is limited to those cases in which anatomical defect can be corrected by operative measures. The labia, if fused together, may be separated by breaking the adhesions or by incision. The hypertrophic clitoris or labia may be removed and the wounded surfaces covered by means of a plastic operation.

The bridle or frænum holding down the penis in androgyny may require an operation for the liberation of the organ, and plastic work for the covering of the exposed surfaces.

Epispadias and pseudo-hermaphroditism may furnish indications for operative measures, and if so, must be treated in each case according to the special requirements.

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## CHAPTER XXXVIII.

### CONGENITAL GYNATRESIA WITH RETAINED MENSTRUAL FLUID.

ATRESIA in the genital tract of a menstruating woman results in the retention of the menstrual fluid above the point of obstruction. The fluid thus retained is of a dark, thick, tar-like color and consistency. It contains blood, mucus, and epithelial débris. Its heavy consistency and color are due to partial absorption of the fluid constituents.

The following figures, from 256 to 267, will show the accumulations of menstrual fluid which may take place above the various possible points of atresia in the uterus, vagina, or vulva. The accumulations come under one of the three following divisions:

1. An accumulation in the vagina. The distention will take place above the point of vaginal or vulvar atresia. This is called *hæmatocolpos*.

2. An accumulation in the uterus. This is *hæmatometra*. It is limited below according as the atresia is at the internal or external os, in the corpus, or in the cervix uteri. A distended cervix is called *hæmatotrachelos*.

3. The uterus having been distended, the blood may force its way into and distend the Fallopian tubes, producing *hæmatosalpinx*. The fimbriated extremity in such cases is closed by adhesive inflammation. *Hæmatosalpinx* due to retention of menstrual blood is usually associated with *hæmatometra*.

*Hæmatocolpos* may exist alone or may be associated with *hæmatometra* and *hæmatosalpinx*.

#### The Pathological Results.

The pathological results are primarily those of pressure upon the mucosa and distention and thinning of the walls of the dilated organs; this leads to atrophy of the mucosa and muscularis; secondarily, there

may be infection and consequently admixture of pus with blood. The conditions may then be termed pyocolpos, pyometra, and pyosalpinx.

### Symptoms.

The symptoms are commonly absent until puberty; at this time menstruation first begins and gives rise to the accumulations of menstrual blood. The young girl will then have the symptoms of monthly recurring menstruation called the *molimen*, with the sense of superadded weight and heaviness due to accumulations of menstrual fluid. The sense of weight will increase with the quantity accumulated, and in cases of extreme hæmatometra will become excessive, and may resemble labor pains. There will also be distressing pressure on the adjacent organs. Suppuration, if present, gives rise to the same symptoms of absorption as would result from an abscess.

### Diagnosis.

The physical signs will reveal a fluctuating elastic tumor corresponding to the seat and extent of the accumulations. This tumor, if in the vagina, will be felt most distinctly in that region, and may

FIGURE 256.<sup>1</sup>

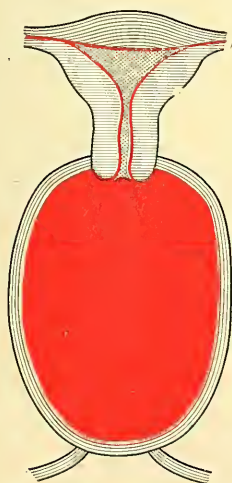


FIGURE 257.

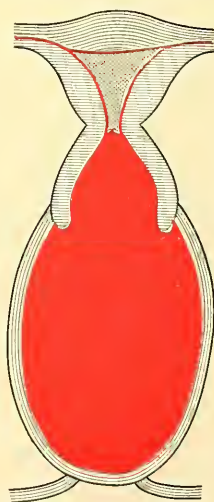


Figure 256.—Atresia at the vulva first causes distention of the vagina, producing hæmatocolpos.  
Figure 257.—Atresia at the vulva. Hæmatotrachelos has followed hæmatocolpos.

bulge between the labia; if in the uterus and tubes, it will easily come within the reach of the external hand on conjoined examination, and the fluctuation will be clear on palpation between the vagina and

<sup>1</sup> Figures 256 to 267 suggested by and modified from Sutton and Giles's Manual of Diseases of Women.



hypogastrium. The distended tubes are usually made out to either side of the distended uterus. Conjoined examination with the left index-finger in the rectum may give further information. The finger in the

FIGURE 258.

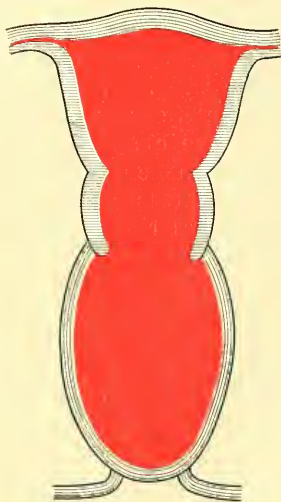


FIGURE 259.

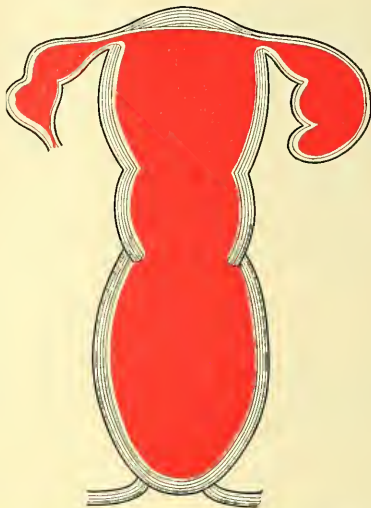


Figure 258.—Atresia at the vulva has caused hæmatocolpos, then hæmatotrachelos, and then hæmatometra.

Figure 259.—Atresia at the vulva. In addition to the conditions in Figure 258, there is added hæmatosalpinx.

FIGURE 260.

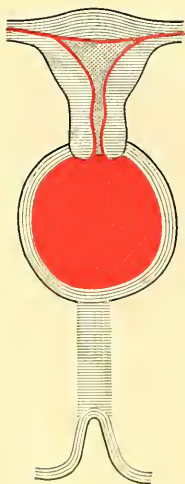


FIGURE 261.

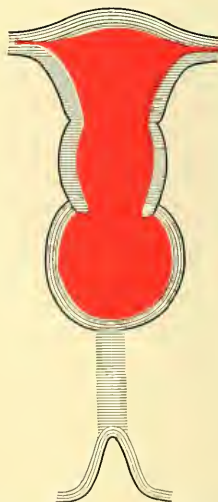


Figure 260.—Atresia in the vagina midway between the vulva and os externum, causing hæmatocolpos in the upper half of the vagina.

Figure 261.—Same as in Figure 260, except that distention of the whole uterus has followed the partial hæmatocolpos.

rectum and the sound in the bladder will sometimes define the upper limits of hæmatocolpos.

If the atresia is at the *os internum* it gives rise to no change in the form of the cervix, but gives to the corpus uteri the appearance of pregnancy.

FIGURE 262.

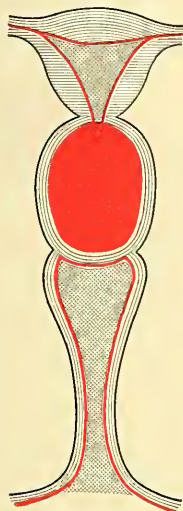


FIGURE 263.

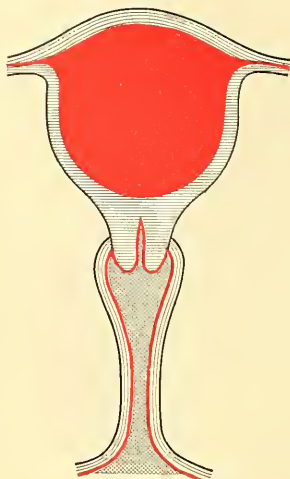


Figure 262.—Atresia at the *os externum* producing hæmatotrachelos. Corpus uteri not yet distended.

Figure 263.—Atresia at the *os internum* producing hæmatometra. Fallopian tubes may become distended later.

FIGURE 264.

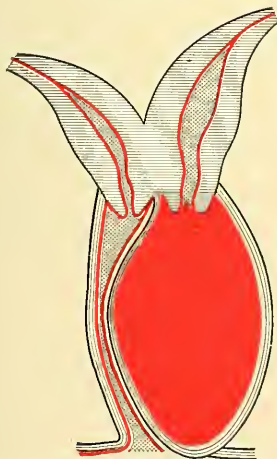


FIGURE 265.

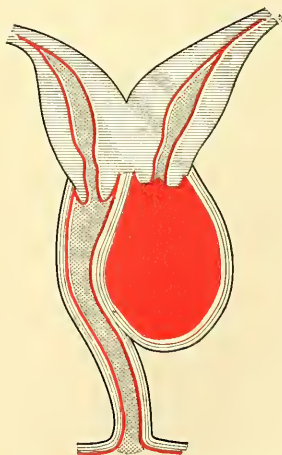


Figure 264.—Atresia at the vulva on one side of a double uterus and vagina, causing hæmatocolpos on affected side.

Figure 265.—Atresia on one side of double uterus and vagina midway between vulva and *os externum*. This produces partial hæmatocolpos of affected side.

One side of a double vagina or uterus may be distended and the other side empty. There will then be a tumor on the affected side and lateral displacement by pressure. The symptoms, supplemented by conjoined examination and the sound, will be the means of diagnosis. The groove between the distended and empty sides may be felt on rectal touch.

FIGURE 266.

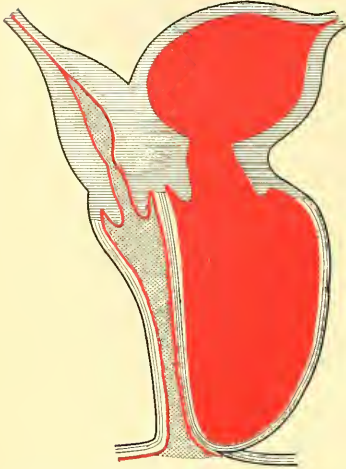


FIGURE 267.

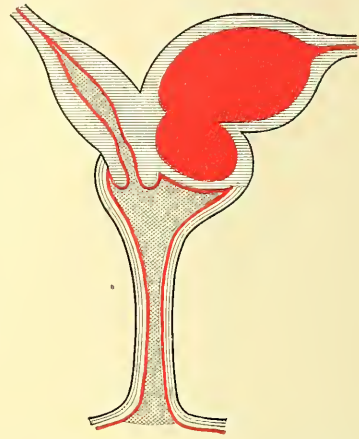


Figure 266.—Atresia on one side of double uterus and vagina at vulva, producing hæmatocolpos, hæmatotrachelos, and hæmatometra.

Figure 267.—Atresia on one side of double uterus and vagina at os externum, producing hæmatotrachelos and hæmatometra.

Hæmatometra is distinguished from pregnancy by the absence of the usual signs of pregnancy, especially of discoloration, patulous os externum, and vaginal pulsation. Hæmatocolpos or hæmatometra on one side of a double uterus or vagina may lead to great confusion. Conjoined examination and the history of the case will serve to distinguish the former from extra-uterine pelvic tumors and the latter from abscess or cyst of the vaginal wall.

The greatest care in manipulation is essential lest the sac rupture and discharge its contents into the peritoneum, or the fluid be forced through the Fallopian tubes. The fluid, however, is apt to be sterile.

#### Prognosis.

Unless relief comes from operation the thin walls, especially of the Fallopian tubes, may rupture and set up dangerous peritonitis. Suppuration may give rise to all the dangers incident to pelvic abscess. If the sac ruptures into the intestine there may be dangerous infection and death or a precarious recovery.



## Treatment.

The treatment is free incision at the point of atresia, evacuation of the accumulated fluids, washing out and drainage of the cavity. There is in these cases an unexplained and excessive liability to post-operative infection. Extra care therefore in the asepsis before, during, and after the operation is imperative.

Operations for Hæmatometra will vary according to the location and extent of the atresia. In some cases the obstruction is slight and easily broken by a sound or by pushing a pair of blunt-pointed scissors or forceps through it, and spreading the blades to secure the necessary divulsion and dilatation. The canal once opened should be made to remain patulous, if necessary, by immediate free incision or dilatation. The atresia may be at the internal or external os, or the whole cervical canal may be obliterated. In the latter case it is sometimes necessary to separate the bladder from the uterus as in anterior vaginal section. The separation does not necessarily extend into the peritoneum, but should be carried past the level of the internal os. The anterior wall of the uterus may then be divided longitudinally with scissors until the interior of the corpus is reached and evacuated. The opening thus made is rendered permanent by additional incision, gauze packing, or dilatation, or all these combined.

Hæmatometra may occur with complete or nearly complete absence of the vagina. See page 416. Under these conditions the choice of procedure is between :

1. Artificial vagina.

2. Abdominal hysterectomy or removal of the appendages.

1. *Artificial Vagina* consists in separating the vesical from the rectal plate of the recto-vaginal septum and entering and evacuating the uterus through the canal thus made. The incision is first freely made from side to side through the vulvar skin, the two plates of the rectovesical septum are readily split apart by means of the two index-fingers, which easily work their way through loose cellular tissue to the uterus. The uterus will be recognized when reached by its relative hardness and resistance, and by the elasticity and sense of fluctuation imparted by the retained fluid. It is opened by means of the sharp-pointed scissors, using as a guide the aspirator needle previously introduced. In working his way up to the uterus, the operator may avoid entering the bladder or rectum by frequently introducing the finger into the rectum and the sound into the bladder.

The only objection to this method is the strong tendency of the artificial vagina to contract and become obliterated. This is prevented by the constant wearing of the Sims glass vaginal plug. See page 174. Emmet says that finally, in some cases, the new vagina when it heals over glass is covered by a structure not altogether unlike mucous membrane, and that after healing has taken place the frequent use of the glass dilator will keep the vagina open. The writer's experience in three cases personally observed is that no such membrane formed, but that, on the contrary, the surfaces were entirely cicatricial or granulating in character.

2. *Abdominal Hysterectomy or Removal of the Ovaries.* If the artificial vagina persistently contracts and cannot practically be kept open as an outlet for menstrual fluid, the removal of the uterus would be justifiable and preferable to removal of the ovaries.

Operations for Hæmatocolpos. If the obstruction be only a thin membrane it may be freely incised and the fluid let out as in hæmatometra. In some cases there is absence of the lower and distention of the upper part of the vagina, and perhaps also of the uterus and Fallopian tubes. A passage must then be carefully made to the point of atresia for opening the vagina in hæmatometra. The patency of the vagina is maintained by the constant or frequent use of the glass vaginal plug. If the atresia is in the very lower part of the vagina, the labia or skin about the vulva may be dissected loose and transplanted so as to cover the raw vaginal walls. Contraction from progressive cicatrization may in this way be prevented.

An operation for hæmatocolpos or hæmatometra on one side is apt to result in closure of the opening and refilling of the cavity. For this reason it is important in the effort to secure a permanent result to include in the operation the free division of the septum in the vagina and, so far as practicable, in the uterus.

In hæmatosalpinx the tubes will usually empty themselves through the uterus when that cavity is drained, and do not therefore have to be removed.

Hæmatocolpos and hæmatometra may be the result of traumatic as well as of congenital atresia; the principles of treatment are then the same as for the congenital anomaly—that is, to let out the confined fluid and adopt measures to keep the passages open.

The formation of an artificial vagina in cases of vaginal atresia and rudimentary uterus has in rare instances been followed by development of the uterus and normal menstruation, and may therefore possibly result in maternity. The probability of such a result, however, is so slight as to discourage the operation.

It occasionally happens that complete atresia of the vagina and absent or extremely rudimentary uterus are not discovered until after marriage. In such a case maternity is clearly impossible. The question has then arisen whether the formation of an artificial vagina is justifiable. Cases have been reported in which after the operation marriage was happy and the woman even recovered from a tendency to melancholia, and experienced great improvement in nervous tone and general strength. The operation, if performed, follows the technique already laid down for the formation of artificial vagina in cases of hæmatometra; the question of its propriety may safely be relegated to the department of ethics and casuistry.

# PART IV.

## TRAUMATISMS.

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### CHAPTER XXXIX.

#### NON-PUERPERAL INJURIES TO THE VULVA, VAGINA, AND CERVIX UTERI.

Injuries to the Vulva. The external genitals are protected from violence by their situation and relations to the surrounding parts, and are, therefore, little exposed to external traumatism.

#### Etiology.

The following causes are most frequent : 1. Falling upon a sharp substance. 2. Self-inflicted wounds by the insane. 3. Violent coitus. 4. A blow or fall may so bruise the soft parts against the sharp edges of the descending ramus of the pubes or the ascending ramus of the ischium as to make a deep cut. The cut may appear at the surface or may be subcutaneous.

#### The Symptoms.

The symptoms are the same as those of similar injuries elsewhere. Hemorrhage from the abundant vessels about the vulva is usual in wounds of that region. When the wound is external the bleeding may be alarming, even fatal. Great subcutaneous extravasation of blood may occur in the bruised parts. This when clotted forms *pudendal hæmatoma*.

#### Treatment.

Superficial incised wounds should be treated by suture. Bleeding-points should be ligated by fine catgut. Deep punctured wounds are best treated by compresses, which serve for dressings and to control hemorrhage. Small hæmatoma may disappear by absorption ; if too large for absorption compresses should be applied for four to eight days, until all danger of hemorrhage has passed. Then a free incision is made, the clot turned out, the cavity packed with aseptic gauze and allowed to heal from the bottom. Suppuration is treated by incision and drainage.

Injuries to the vagina and vaginal portion of the cervix uteri of non-puerperal origin are more rare than to the vulva. They may



result from violent coitus or from the violent application of any other force. The control of hemorrhage and the repair of vaginal wounds follow the general principles of surgery.

## CHAPTER XL.

### THE PERINEUM AND PERINEAL REGION.

#### Anatomy. Functions. Puerperal Lacerations.

INJURIES to the vaginal outlet and pelvic floor caused by parturition, and inadequately designated as lacerations of the perineum, are among the most frequent of the gynecological lesions. Even though their importance be sometimes overestimated, the fact is undeniable that they give rise to many serious disorders and inconveniences. It is not always possible to avoid the accident, but it is possible to recognize it when it occurs and, by a timely operation, prevent its evil consequences. The duty of the obstetrician includes, therefore, a careful examination of the vaginal outlet immediately after labor, and another toward the end of the puerperium several weeks later. The latter examination is necessary because some of the worst injuries are not at first apparent. A laceration which does not extend into and involve the sphincter ani muscle is called *incomplete*. If the sphincter is sufficiently injured to impair its functions—*i. e.*, if the patient has lost the power to retain the contents of the bowel—the laceration is *complete*.

#### Anatomy of the Perineum and Perineal Region.

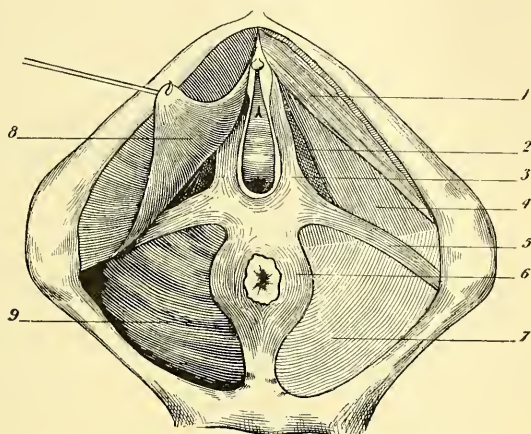
Figures 268 and 269 show the component parts of the perineum. It is the converging point where many of the most important parts of the pelvic floor come together. These supports are the bulbocavernosus muscles, the transversus perinei muscles, superficial and deep, the external sphincter ani muscle, the internal sphincter ani muscle, and the levator ani muscle. These muscles are surrounded and bound together by deep and superficial fascia; in some places it is quite dense, ligamentous, and resisting; the triangular ligament is an example. All the perineal muscles through the medium of tendon and fascia are strongly connected with the pubic bones.

Even the sphincter ani, a muscle of special functions, which is attached posteriorly to the tip of the coccyx, is closely united to the other muscles of the perineum, and, therefore, indirectly to the pubic bones by interlacing of its fibres with theirs and by its tendinous and fascial attachments. The muscles, ligaments, and fascia which unite in the perineum form a diaphragm which fills the pelvic outlet<sup>1</sup>

<sup>1</sup> Adapted from Skene. New York Medical Journal, March 14, 1885.

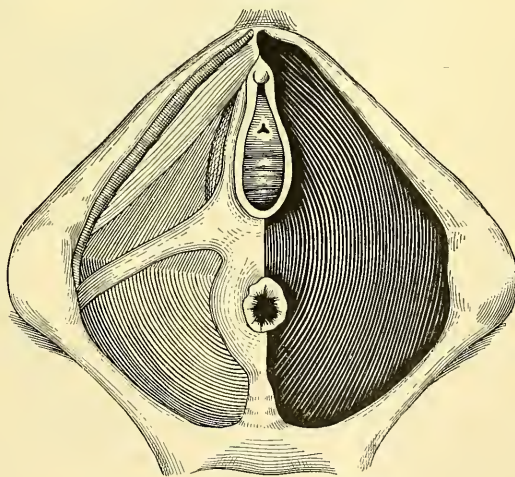
and transmits the lower portions of the rectum, anus, vagina, and urethra.

FIGURE 268.



1. Erector clitoridis. 2. Bulbo-cavernosus muscle. 3. Constrictor vaginae muscle. 4. Triangular ligament. 5. Transversus perinei muscle. 6. Sphincter ani muscle. 7. Fascia of the levator ani muscle. 8. Perineal fascia. 9. Levator ani muscle.

FIGURE 269.



Right side showing vesico-rectal fascia.

### Functions of the Perineum and Perineal Region.

It is clear from the foregoing paragraphs and illustrations that the muscles, fasciæ, and ligaments of the perineal region constitute a most essential supporting part of the pelvic floor. They surround, bind together, hold in position, support and maintain in their mechanical relations the terminal ends of the rectum, vagina, and urethra. The

reader is now prepared to take exception to the common notion that the pelvic organs derive their support from the small fleshy body called the perineum. Another false idea is that the support is in the nature of that given by a keystone to an arch. The perineal region and perineal body do not give support in the sense of being under the pelvic floor and holding it up as Atlas was once thought to support the world. They are an essential and integral part of the pelvic floor, and as such contribute to its support and to the support of the abdominal organs above. It is equally untrue that the muscles, especially the levator ani, furnish a continuous support—*i. e.*, it is unphysiological for

FIGURE 270.



Normal relations of the pelvic organs, showing the vaginal walls resting on the perineal body.

muscles to be in a constant state of action. Such tension would soon destroy their power. The recto-vesical fascia, see Figure 269, is in itself sufficient, when intact, to afford the required support. Moreover, the muscles do not immovably fix the parts; they limit their movements within the normal range. Their chief function is to control the lower portions of the rectum, vagina, and urethra in the performance of their functions.

A very suggestive, convincing, and clear statement of the supporting power of the levator ani muscle comes from Dr. William W. Browning, of Brooklyn.<sup>1</sup>

<sup>1</sup> Medical News, June 12, 1897.



His conclusions are as follows :

“1. That in the human subject it belongs to the class of rudimentary muscles.

“2. That the weakness of its origin, as well as the direction and the insertion of its fibres, is inconsistent with such design.

“3. That it is unphysiological for a muscle to furnish a continuous support.

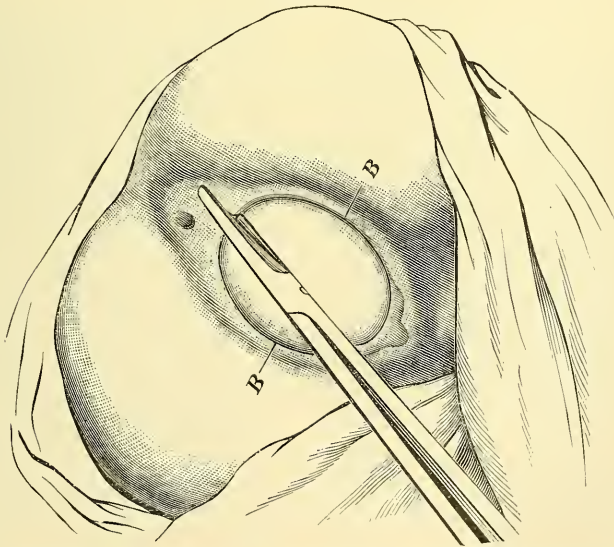
“4. That the recto-vesical fascia is in itself sufficient, when intact, to afford the required support.

“5. That the muscle is no better developed in the female (in whom support is most required) than in the male.”

### Lacerations of the Perineum.

A mere rupture in the perineal body where certain muscles, fasciæ, and ligaments of the pelvic floor converge is not necessarily very significant. If, however, the injury involves the rending asunder of these supports, especially the fascial supports, if they are so divulsed as to lose their sustaining power, and, above all, if they are torn off from their pubic attachments, the lesion becomes more serious.

FIGURE 271.



Correct incision in episiotomy. Lines, *B B*, show incorrect place for incision.

**Causes and Prevention.** Relative disproportion between the child and the perineal outlet may, unless an incision is made, render laceration inevitable. Among other unpreventable causes are rapid labor and œdema of the vulva. The preventable causes and the means of protecting the perineum during labor are fully laid down in all works on midwifery. If during labor rupture seems imminent, it is better to divide the vulvar ring by an incision known as episiotomy,

and thereby substitute for a ragged lacerated wound, which may perhaps involve the sphincter muscle, a clean cut in another direction. The usual method of episiotomy is to make a transverse incision through the middle of the labium majus on each side. The objections to these incisions are that the rents may extend still further laterally as the head passes, and an additional fresh tear may occur at the posterior commissure of the vulva. This would make three wounds, all in awkward directions. In place of this a single incision in the direction and location shown in Figure 271 is preferable. If the tear extends beyond the incision its direction does not imperil the sphincter ani muscle.

Complete Laceration through the sphincter ani muscle entirely destroys the retentive power of the bowel. The rupture in rare instances occurs subcutaneously without a visible break in the cutaneous surfaces around the anus. Relaxation of the sphincter and incontinence of the bowel may also occur independently of laceration. The diagnosis then depends upon the presence of an open, relaxed anus. Complete laceration, being usually in the median line, does not tear the supports of the pelvic floor as much as the incomplete.

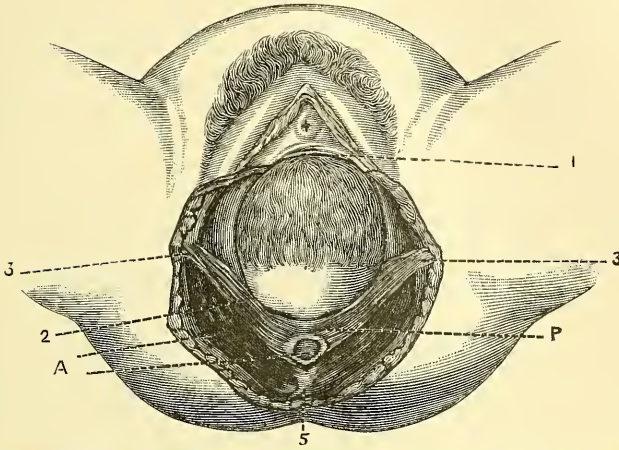
The Results of Incomplete Laceration vary with the extent of injury and direction of the tear. The extent to which the laceration is visible to the eye is not a safe criterion, for, as already explained, the chief injury may be in the deeper structures and recognized not by sight, but by its effects. The effects may not be apparent immediately after labor; hence further examination is a necessary part of the efficient management of the puerperium—one examination immediately after labor, to recognize and at once repair such injury as may at that time be visible; another six weeks later, to recognize and repair, if present, any deeper injuries to the perineal fascia or muscles.

The direction of the tear is most significant: if in the median line the muscles, fascia, and ligaments are not so seriously injured; on the other hand, a tear extending transversely across the perineum, especially if these structures are torn apart or torn away from their pubic attachments, may give rise to the more serious lesions to be described later.

Figure 272 shows the child's head pressing powerfully downward upon the transversus perinei and the bulbo-cavernous muscles and their fascia.

This powerful downward pressure gives rise to great sagging of the pelvic floor, and if the recto-vesical and other fasciæ are extensively injured, the sagging, unless relieved by a suitable perineorrhaphy, is apt to be permanent. In such a case the direction of the tear is usually transverse, not median. After the injury the whole pelvic floor, including the rectum, vagina, urethra, and bladder, now deprived of their support, tend to downward and backward displacement toward the tip of the coccyx. The result is similar to that of cutting the guy ropes of a tent. The rectum, bladder, and vagina fall, as the lower jaw would fall if the masseter and temporal muscles were cut. The backward displacement of the perineum is an incident and an index of the sagging. In very many of the worst cases the injury is mainly intra-

FIGURE 272.



Downward pressure on the pelvic floor in parturition. This figure shows how the transversus perinei and bulbo-cavernous muscles and fascia may be injured.<sup>1</sup>

FIGURE 273.

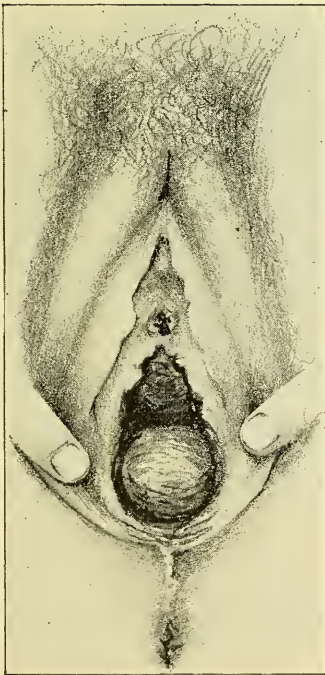


FIGURE 274.

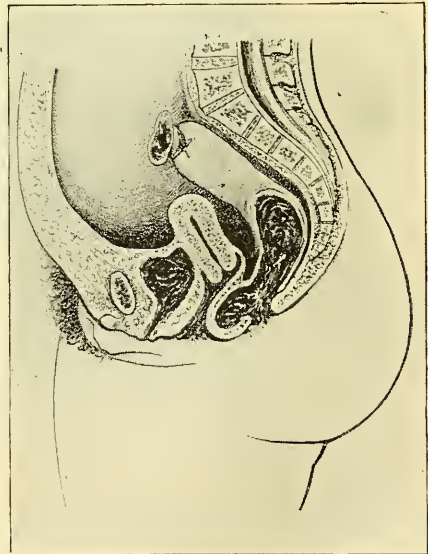


Figure 273.—Front view of a rectocele. Perineum more relaxed than torn.<sup>2</sup>  
 Figure 274.—Sectional view of a rectocele. Perineal body impaired.<sup>2</sup>

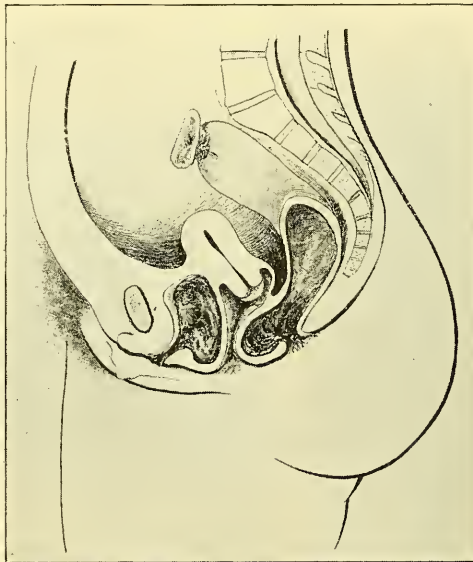
<sup>1</sup> American System of Gynecology. (After Coe.)  
<sup>2</sup> Thomas and Mundé, Diseases of Women.



vaginal, and shows little or no external evidence of laceration, that is, the cutaneous structures between the anus and the posterior commissure of the vulva may be unbroken. The palpable, visible split perineum may have relatively little significance, but injury to the recto-vesical fascia and to the other fasciæ of the pelvic floor gives rise to most serious displacements and nutritive disorders. The injury to the muscular part accounts less for the displacements than for the associate impairment of function in the organs which the muscles control—that is, in the bladder, urethra, vagina, and rectum.

*Rectocele.* Figure 270 shows the direction of the anus to be at an angle to that of the rectum, so that as fecal matter comes down it must, in passing from the rectum out through the anus, turn this angle; in so doing it strikes against the rectal side of the perineum, and is thence deflected through the anus. If the injury to the perineal body has made it thin, weak, or relaxed, or otherwise impaired its resisting power, the downward force of the feces, instead of being deflected backward and outward, will cause the posterior vaginal wall

FIGURE 275.

Section of rectocele and cystocele. Perineal body impaired.<sup>1</sup>

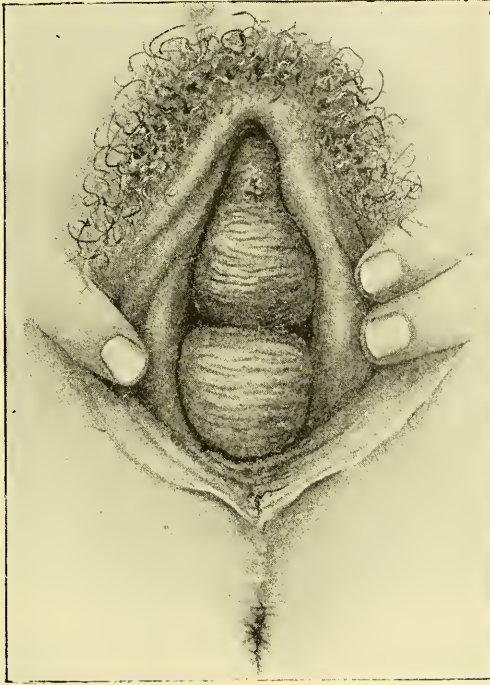
to pouch forward into the vagina. This pouch is a *rectocele*. The fecal matter thus arrested requires, with the enlarging pouch, more and more force for its expulsion, and the pouch will therefore increase; the result will be rectal and anal tenesmus, irritation, and sometimes anal fissure or fistula, or hemorrhoids.

*Cystocele.* The perineum having been impaired by rupture, the vesico-vaginal septum, which normally rests upon it, tends to sag and bulge forward into the vaginal outlet in the form of a pouch. This

<sup>1</sup> Thomas and Mundé. Diseases of Women.

pouch is called *cystocele*. The patient, except in the knee-chest position, cannot completely empty the bladder, residual urine accumulates in the pouch, decomposes, irritates the bladder, and may set up cystitis or may even lead to the formation of stone in the bladder. Often, during stool, women are obliged to hold back the protruding organs in order to empty them.

FIGURE 276.

Front view of cystocele and rectocele.<sup>1</sup>

The downward force of straining at stool to empty the bladder and rectum increases the prolapse of the vaginal wall, which, being attached to the uterus, drags that viscus together with its appendages and the rest of the pelvic floor to a lower level, and thereby gives rise to various displacements of the reproductive organs.

A wide range of organic and mechanical disorders naturally result from the above conditions; among them hypertrophy and swelling of the vaginal walls, bearing-down sensations, a feeling that the "bottom has dropped out," difficulty of walking and standing, backache, constipation, and many nervous disturbances.

Owing to the unguarded state of the entrance, air may accumulate in the vagina, and at intervals, on slight change of position, be suddenly expelled with an audible sound. Chronic nervous invalidism is the possible indirect result of laceration of the perineum. This subject is further discussed in the chapter on displacements.

<sup>1</sup> Thomas and Mundé. Diseases of Women.

## CHAPTER XLI.

## PERINEORRHAPHY.

ALTHOUGH some relief is often possible from the artificial support of a pessary, perineorrhaphy is usually necessary to a satisfactory cure. This operation in a properly broad sense comprises not merely the closure of the torn perineum, but as well the repair of the injuries both deep and superficial of other structures in the perineal region.

One of the most important and most serious maxims in gynecology should be, "Never attempt the primary or secondary closure of a torn perineum until you have fully and clearly demonstrated and appreciated the direction or directions and extent of the injury."<sup>1</sup>

## Direction of the Tear.

A number of years ago the writer was called to make immediate repair of an incomplete though extensive rupture of the perineum. He had the notion, then commonly received, that such a rupture was usually a splitting apart of the perineal body into two lateral fragments which at once retracted to the corresponding sides. Accordingly, sutures were introduced from side to side in a way to reunite the lateral fragments by a line of union which should extend in the median line from the cutaneous to the vaginal side of the perineal body. The amazing result of this procedure was almost complete closure of the vulva. The index-finger could only with difficulty be introduced into the vagina.

The absurdity was more apparent than the explanation; evidently the lacerated surfaces had not been properly brought together—but why? Upon removal of the sutures the torn surfaces were again exposed. A study of the injury was then made by hooking together opposite sides of the torn surfaces in different directions with tenacula. The result of the experimental approximation finally demonstrated the direction and character of the rent.

The four diagrams under Group I., Figure 277, explain the nature of this lesson and the operation of repair. Diagram 1 shows the margins of the wound before approximation. Diagram 2 shows the approximation, the correctness of which was demonstrated by the fact that all the little irregularities accurately fitted into one another, and that the normal integrity of the vaginal outlet was restored. Diagram 3 shows the sutures in position, but not tied. Diagram 4 shows the lines of union and the sutures tied. The line *a b c*, Diagram 4, represents the line of tear extending from side to side across the vaginal outlet inside the vulva; the point *b* is situated in the median line; points *a* and *c* represent the extremities of the vaginal portion of the rupture which ex-

<sup>1</sup> E. C. Dudley. Chicago Clinical Review, April, 1894. The following description of perineorrhaphy is adapted from this paper.



tended high up across the lateral walls of the vaginal outlet in a direction parallel to the sides of the vulva. The arrow-heads show the directions in which the fragments retracted after the rupture until the exposed surfaces assumed the shape shown in Diagram 1.

The explanation of the closure of the vulva by the first procedure is now clear. It was the result of a line of union made at right angles to the actual line of tear; that is, the vaginal portion of the rupture had been from side to side or in the transverse direction; it was closed as if it had been a longitudinal instead of a transverse tear. This would necessarily close the vulva to a point as high as the injury extended on either side.<sup>1</sup>

In order to explain clearly the mechanism of the rupture shown in Group I., attention is called to another form of rupture, known as complete, central rupture of the perineum; that is, a rupture in which the child is produced not through the vulva, but through a perforation extending from the vaginal side of the perineal body, directly through the perineal body to its cutaneous side, where the birth is completed between the vulva and the anus. This complete, central rupture of the perineum takes place in the transverse, not in the longitudinal direction. Its transverse direction is determined by the general arrangement of the muscles and fascia surrounding the vulva, whose fibres run for the most part in that direction and are more readily separated than torn asunder.

The vast majority of lacerations commence as in complete central rupture, following the direction of least resistance, that is, transversely, and continue until considerable progress has been made in the separation of the perineal structures into anterior and posterior fragments (line *a b c*, Group I., Diagram 4). Then, instead of continuing to the completion of the central rupture and the perforation of the perineal body, the expulsive forces are more and more opposed by the strength of the deeper perineal structures, the direction of least resistance changes to the longitudinal, with a corresponding change in the direction of the rupture, which now takes the longitudinal direction shown in line *b f*, Diagram 4. Again, notice the direction of retraction of the three torn fragments as shown by the arrow-heads in Diagram 4, a retraction which makes the irregular, torn surface of Diagram 1. The exposed surface of Diagram 1, being partially intravaginal, often requires for its demonstration the sides of the vulva to be separated, or the perineum to be lifted forward by the index and middle finger in the rectum.

The diagrams in Group I. represent a typical perineal laceration;

<sup>1</sup> At the meeting of the American Medical Association in June, 1883, I described the transverse laceration of the perineum and its operative treatment. The paper was published in the Transactions of the Association of that year. This paper had reference only to the fresh laceration and the immediate operation. In the first edition of Emmet's Principles and Practice of Gynecology, which appeared about six months later, that author gave to the profession the epoch-making operation on the vaginal outlet which has since been known by his name. Emmet's observations had special reference to the secondary operation, and were made without knowledge of my studies upon the fresh laceration, as mine were made without knowledge of his work in the secondary operation. It is the great credit of Emmet to have given to the profession a secondary operation which brings the posterior vaginal wall up against the anterior more perfectly than any other, but which, as we shall soon observe, is not one of universal application. Besides, there are some matters of technique, soon to be described, which add greatly to the result in bringing the perineum up to the pubes.

FIGURE 277.

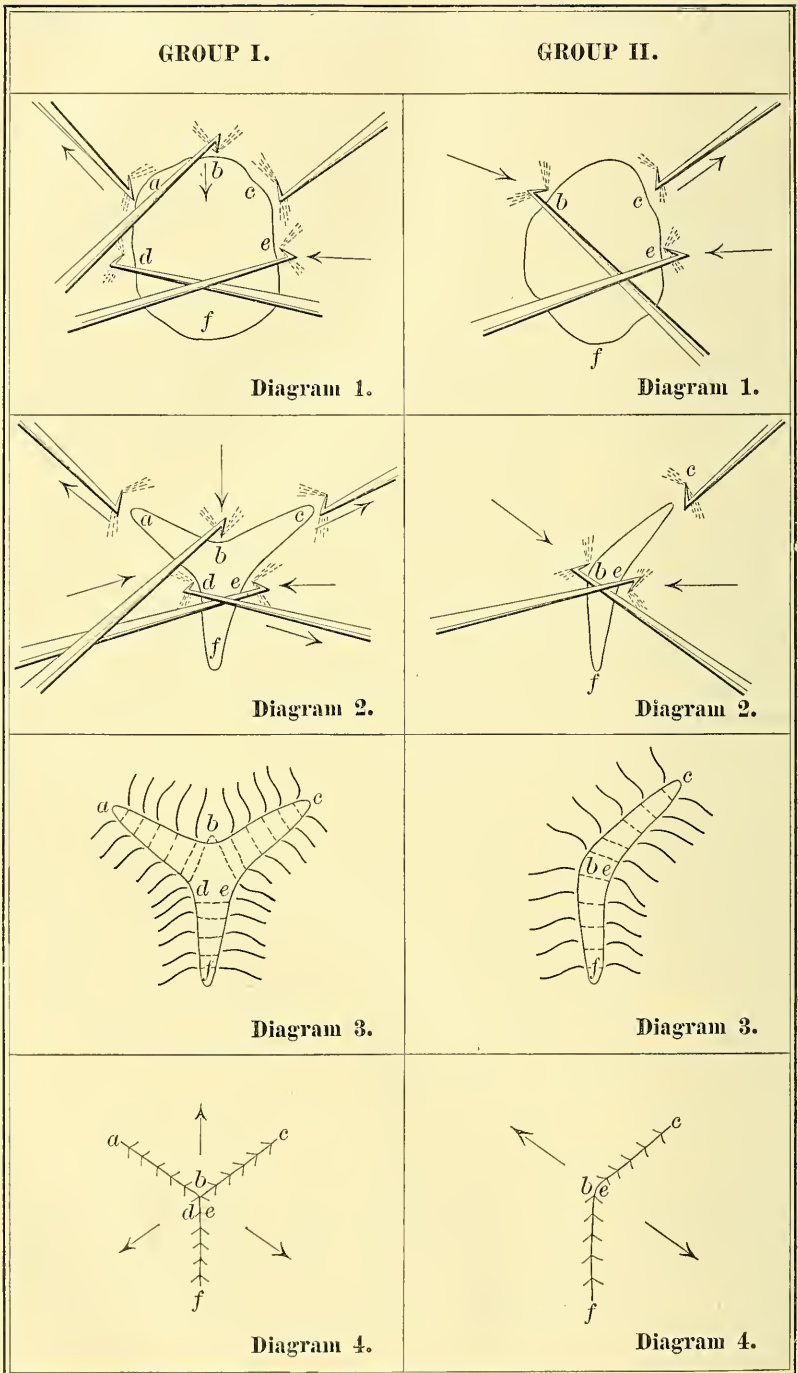
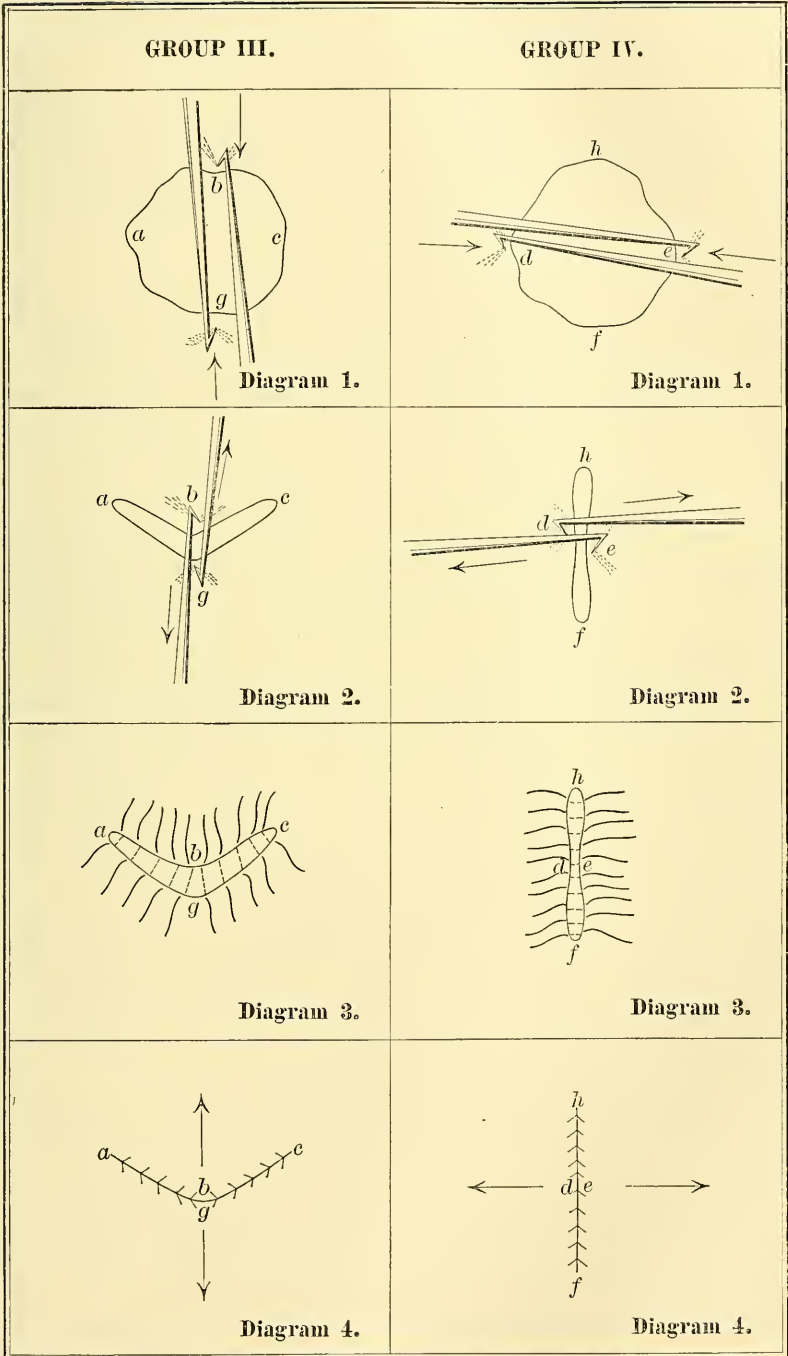


FIGURE 278.





the other three groups show various modifications of this type. In all these four groups Diagram 1 represents the exposed, torn surfaces of the bruised and distorted vaginal outlet, which approximate in each instance a polygon or a circle bounded by a broken outline. It is an interesting fact that the description of any one of these torn surfaces without change will apply equally well to any other; that is, when the labia are separated, the outline of the torn surfaces does not necessarily give a definite idea of the direction of the rent. For example, the rent may be in the antero-posterior direction, and the two lateral fragments may have retracted to their corresponding sides, making the outline of the laceration as shown in Group IV., Diagram 1; or the rent may have occurred transversely, and the torn fragments may have retracted, the one toward the vaginal outlet and the other toward the upper end of the vagina, leaving a similar torn surface, the outlines of which are shown in Group III., Diagram 1. This indefiniteness in the shape of the outlines of the exposed surfaces in the four groups is not only consequent upon the retraction of the torn fragments, but it is also caused by the loose, flabby, contused, rasped condition of the vaginal outlet—a condition common at the end of the parturition.

Notice Diagram 4 in each of the four groups. In Group I. the lines of the tear correspond approximately to the shape of the letter Y. The upper part of the letter describes the transverse, vaginal portion of the tear; the staff describes the longitudinal, vulvo-vaginal portion. We really have three distinct lines of rupture: one shown by the line *a b*, another by the line *b c*, and the third by the line *b f*. Lines *b c* and *b f* of this figure describe the rupture of Group II. In Group II. the vaginal portion of the rupture runs diagonally to the patients' left. A precisely similar condition would be that in which the vaginal portion of the rupture should run diagonally to the patient's right; so that we may have, in addition to Group II. in which the laceration is left-lateral, a precisely similar injury in which it would be right-lateral. Lines *a b* and *b c*, Group I., describe the rupture of Group III.; line *b f*, Group I., describes the rupture of Group IV.

One may find, therefore, in the study of individual cases, by approximating the margins of the tear with tenacula, that the injury may correspond to any one or to all of the lines in Group I., or to any combination of them. It may further show any variation in the length or regularity of these lines. It is a cardinal principle that, be they ever so variable in length and regularity, you can always refer them to the typical lines as shown in Diagram 4, Group I.

The letters which have been used to designate the different points in each cut have, for purposes of convenience, been made to correspond one for all. For example, point *b* in Diagram 3, Group III., occupies the same relative position as point *b* in the two previous figures.

It is important to appreciate the mechanism of the injury as indicated by the arrow-heads in Diagram 4 of each group. They show the direction in which the torn fragments retract to make the broken outline indicated by Diagram 1 of each group.

The upper, branching portion of the Y-shaped tear indicates extensive

injury to the perineal muscles and fasciæ, and requires deep denudation and deep suture to catch the impaired structures.

#### Preparatory Treatment.

The preparatory treatment consists of movement of the bowels and sterilization of the field of operation. The silkworm-gut suture is incomparably preferable to all others, and should be introduced under constant irrigation of hot, sterilized water.

#### Technique of Operation.

In the primary operation it is sometimes necessary to trim off the ragged edges of the wound before introducing the sutures. The secondary operation is substantially like the primary except that, before adjusting the sutures, the surfaces must be properly denuded. Correct denudation is essential, and this is possible only when the lines of rupture are known. When healing has been by granulation after an unsuccessful primary operation or after no operation at all, the cicatricial lines will furnish a useful though not always accurate guide to the directions of the original tear.

The most reliable guide to the surfaces which ought to be united is furnished, as in the primary operation, by means of tenacula, the use of which may be explained as follows :

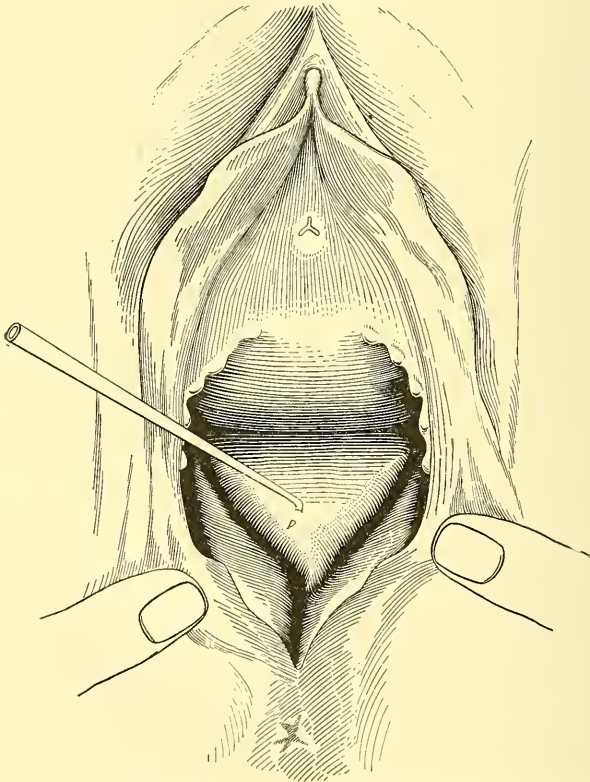
When labor has not resulted in laceration the vaginal outlet will be surrounded by the remains of the hymen, which mark off the vulva from the vagina; that is, by the *carunculæ myrtiformes*. These consist of numerous small protuberances situated near together and surrounding the vulva, as it were, like a string of beads. They are sometimes so close together and pronounced as almost to constitute an annular hymen.

This circular line of *carunculæ myrtiformes*, in case of laceration, is broken at a point near the posterior commissure of the vulva. When this separation occurs the lowest caruncle on either side of the rupture is retracted to the corresponding side of the vaginal outlet. In the typical case, these two lowest caruncles will correspond to points *d* and *e* in the diagrams of Group I. Their location is also indicated in the corresponding points of Groups II. and IV. Figures 279 to 287 show the caruncles as they appear in the various stages of the operation. Group III., being a transverse laceration, does not involve the caruncles. The two lowest caruncles, on being approximated by the tenacula, show the surfaces to be united in the external parts of the rupture.

Then find some point near the centre of the upper fragment, point *b* (if a rectocele has formed, this will be its crest), and while the two caruncles *d* and *e* are being held together, let point *b* be drawn into coincidence with points *d* and *e*. Then will the points *b*, *d*, and *e* come together and form one and the same point. The coincidence of these three points will show the surfaces which should be denuded and united upon themselves. (See diagrams.)

Remove the tenacula at *a*, *c*, and *d*; reintroduce one of them at *f*. Then consider tenacula *b*, *e*, and *f* as hooking up the three angles of a plane triangle. Let traction on the angles of this triangle be made by these tenacula in the hands of assistants, the direction of the traction being from the centre of the triangle toward each angle. The surfaces now put upon the stretch should be denuded. Then remove the tenaculum at point *e* and reintroduce it at point *d*, and place the included triangle *b d f* upon the stretch, and denude as before. This completes the denudation.

FIGURE 279.



Typical incomplete laceration of the perineum; the tenaculum hooked into the crest of the rectocele draws it slightly forward and to the patient's right. The lacerations extend far into the two lateral sulci and from there outward over the fourchette toward the anus.

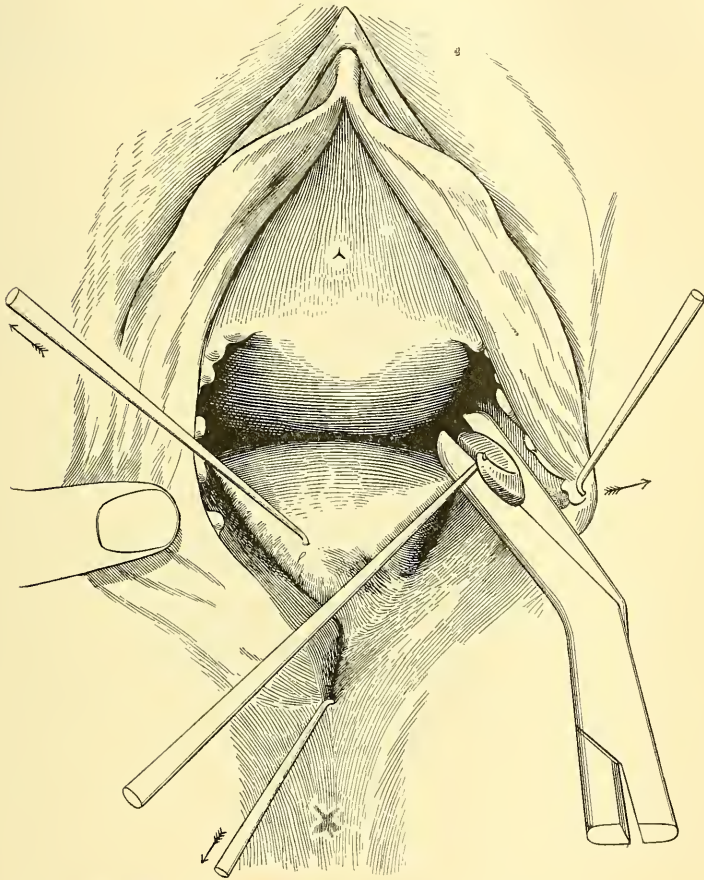
Then remove the tenaculum at point *f* and reintroduce it at point *c*, making traction and at the same time approximating points *b* and *e* with other tenacula.

Then the surface *b c e* is to be united upon itself with a line of sutures so as to bring the line *b c* in coincidence with the line *c e*. In like manner line *b a* must be brought into coincidence with line *a d*. Finally, other sutures close the external rent, *d e f*, upon itself. Observe the suture whose entrance and exit are at points *e* and *d*,



which makes a circuit around point *b*. This suture, which is the "crown stitch" of Emmet, brings points *b*, *d*, and *e* into coincidence. (See Diagram 4, Group I.)

FIGURE 280.



Parts made tense, and thereby exposed for denudation by three tenacula; traction made in direction of arrows by one tenaculum on crest of rectocele, by one on lowest left caruncle, and by one at the outer angle of the tear. These tenacula lift up and render accessible for denudation the torn sulcus on the left side; denudation with Emmet's slightly curved scissors, beginning just inside of the lowest left caruncle. Observe the first point of denuded surface between the scissors and lowest left caruncle.

In the introduction of sutures one of the greatest principles of plastic surgery should be observed, that is, freedom from wound-disease, and consequent union requires the sutures from their points of entrance to their points of exit to be completely buried so that they shall not anywhere appear in the exposed surfaces.

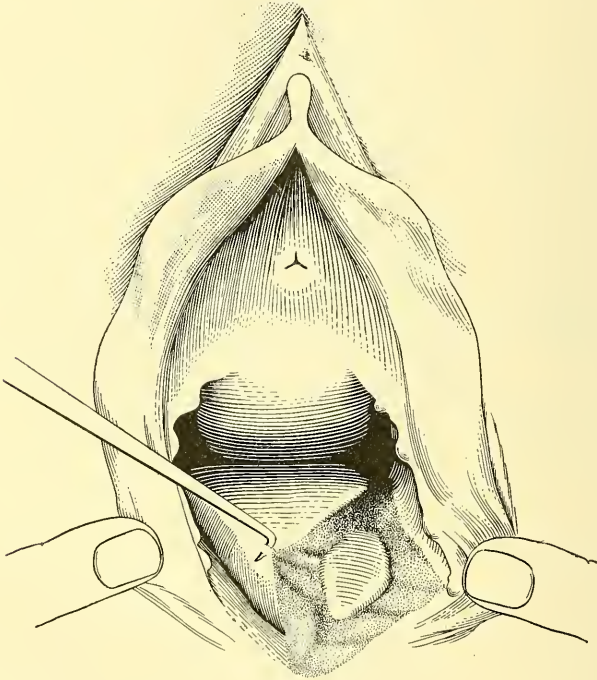
For the past ten years<sup>1</sup> I have introduced each suture and tied it

<sup>1</sup> See Transactions American Gynecological Society, 1890, p. 288.

before introducing the next, instead of introducing all the sutures and tying them as is usually done. One reason for this is that the sutures are less likely to antagonize one another.

In a typical laceration (Group I., Diagram 3) let the first suture be introduced and tied in the angle or sulcus on one side, point *c*. The free ends should not be immediately cut short, but left long and given into the hand of an assistant, who should make firm traction upon

FIGURE 281.



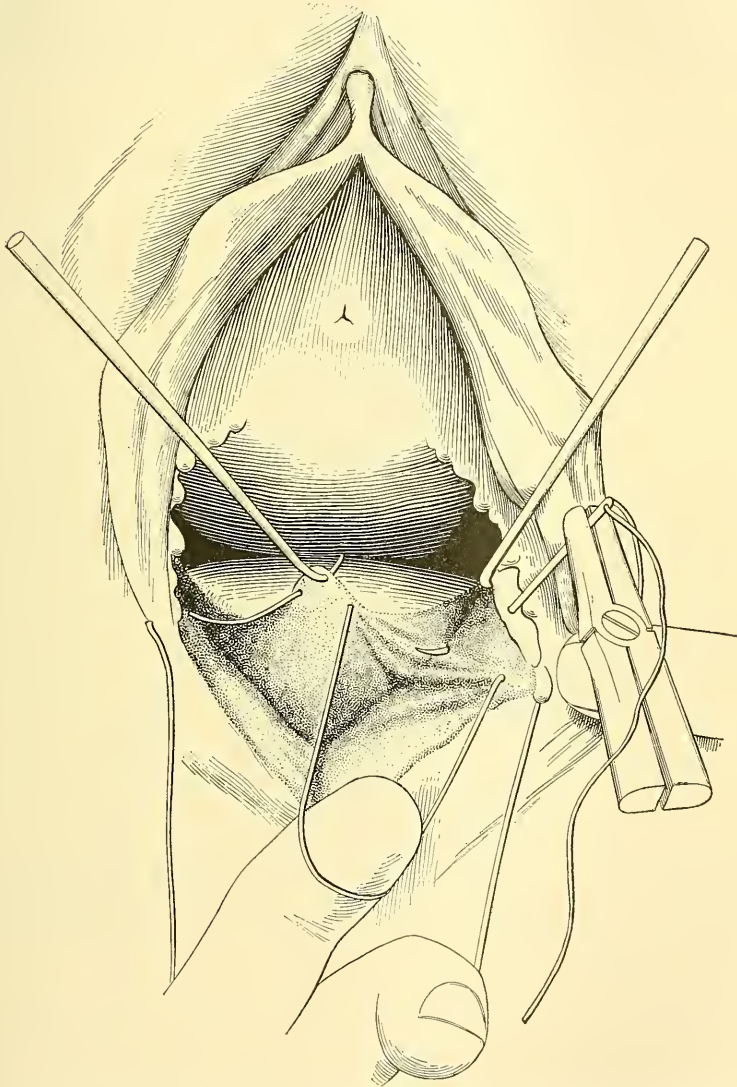
X

Denudation has been carried round the quadrangle on the left side. There remains an island of undenuded surface in the centre. This is easily caught up by means of the tenaculum and denuded with Emmet's scissors, or may be pushed forward by the left index finger in the rectum, and removed with the flat of the scissors. The denudation is completed by the removal of the skin over a similar area on the right side. All small bleeding points are secured by torsion, larger ones by fine buried catgut ligatures.

them in the upward direction toward the pubes while the next suture is being placed and tied, when the long ends of this suture are also given with the preceding one into the hand of the same assistant. Then introduce the third suture, while firm traction is being made on the first two, precisely as the second was introduced, and so on until the required number has been inserted and tied on that side. Repeat this on the opposite side.

Then introduce the crown suture through the lowest caruncle on the left side, catching the crest of the rectocele, or the centre of the upper

FIGURE 282.



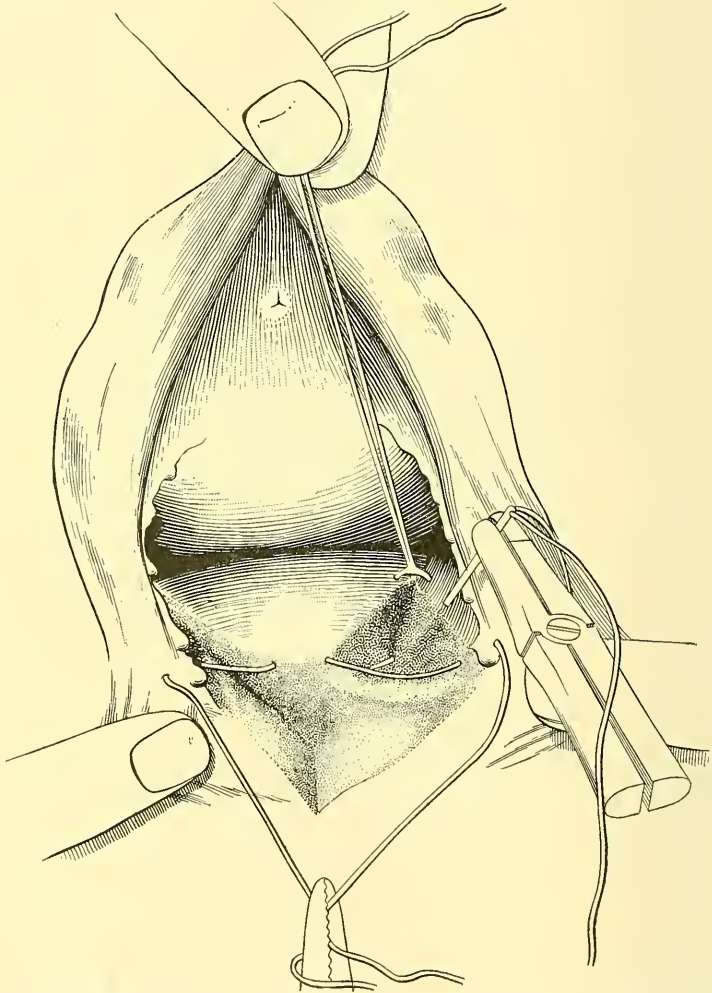
The crown suture, so called, in place. This suture catches up rather deeply the three principal landmarks of the operation, viz., the two lowest caruncles and the crest of the rectocele, and when finally tied brings them together, one tenaculum at the crest of the rectocele and the other at the inner angle of the left sulcus, and the finger at the left caruncle holds apart the denuded surfaces as they are being united on the left side. The operator's right index finger holds the crown stitch out of the way, while with his right hand he introduces the first suture. The needle enters as is shown in the diagram, and will emerge at an angle to its present direction at the corresponding point opposite.



fragment, carrying the suture around, buried all the way, out through the lowest caruncle on the opposite side. This is the crown suture already mentioned which brings the three points, *b*, *d*, and *e* together. The vaginal portion of the operation is now complete. Figure 277.

The external or vulvar portion is closed in the same way; that is, while each suture is being introduced and tied, firm traction should be made upward, in the direction of the pubes, on the preceding sutures.

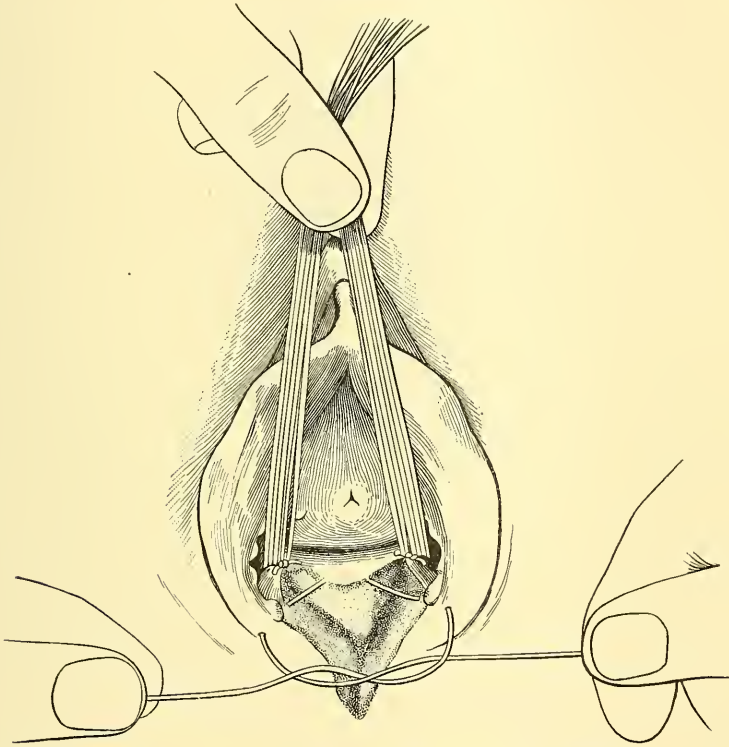
FIGURE 283.



One suture passed and tied. While the second suture is being passed strong upward traction is being made on the first. Throughout the passage and tying of all sutures this firm traction is always made upon those previously tied, especially the one just preceding the one being introduced. The effect of this is to keep the perineum well lifted toward the pubes; if so lifted during the progress of the operation it will maintain its normal position under the pubes, and after the operation will thus fulfil its functions as a support for the pelvic floor.

If the perineum be closed in this way it is surprising to see how it will be brought up so as fairly to hug the pubes. Indeed, the posterior part of the vaginal outlet will almost exert pressure upon the neck of the bladder and pubes. By this method the operator should never fail to get the perineum into its normal position and location.

FIGURE 284.



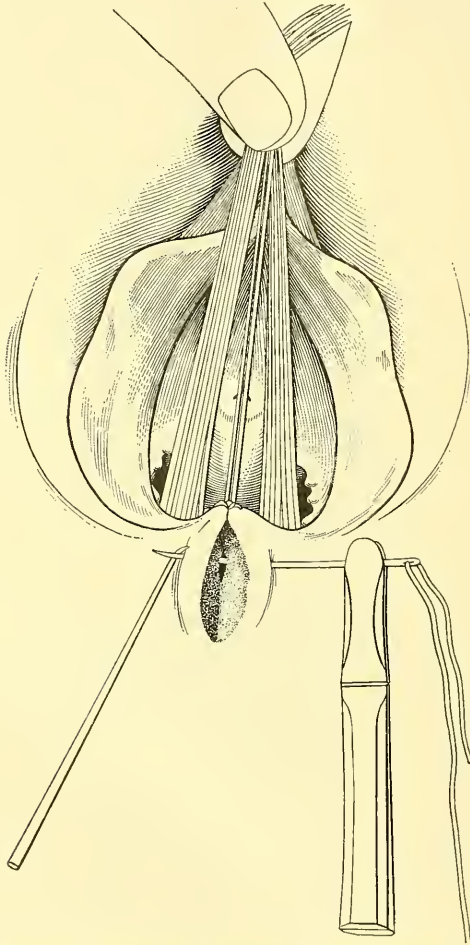
The sutures in the two lateral sulci have all been passed and tied in the manner indicated in the two preceding figures; their free ends, as before, are being strongly pulled upward by the nurse while the operator is tying the crown stitch. This stitch when tied will bring the two lowest caruncles and the crest of the rectocele together and will complete the intravaginal part of the operation. All sutures are introduced and tied under a constant stream of hot sterilized water.

**Material for Sutures.** Silkworm-gut is preferred. The free ends of the sutures are left long. Numerous devices have been used by many operators so to dispose of these ends as to prevent them from irritating the patient. Emmet ties them up in a fan-shaped bundle and leaves them between the thighs; others cut them short. The irritation and suffering from this source are so extreme that some operators have used sutures of softer material, such as silk or catgut; but such material is objectionable because the sutures absorb the wound-secretions, which may decompose and produce suppuration.

I have for several years used a device which entirely obviates this

difficulty. All the sutures are left long enough so that they may be laid down upon the vaginal surface and directed toward the upper end of the vagina. The sutures are all turned into the vagina and

FIGURE 285.



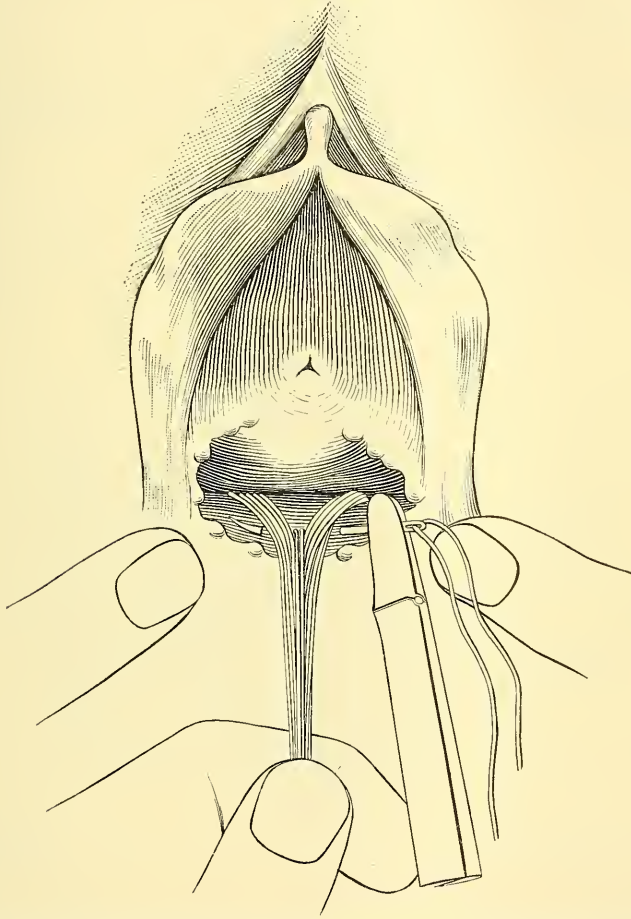
While the nurse continues to make strong traction on the sutures, the operator is introducing the first suture for the repair of the extravaginal part of the injury. Observe the action of the tenaculum in making counter-pressure as the needle is passed through. Notice also that the needle is shown at the bottom of the wound. The general rule in plastic surgery, to bury the suture completely under the wound, although favorable to union, is disregarded in the passage of these outside sutures, for if so buried they would include and draw forward into the restored perineal body the crest of the rectocele. This rectocele is a portion of the recto-vaginal wall, and if not included in the sutures will take its normal place back of the restored perineum.

held there by an additional or binding stitch which is tied over them and is situated just below the crown stitch. The free ends of this binding stitch are also bent inward in the direction of the long axis of the vagina. See Figures 286, 287, and 288.



A study of Groups II., III., and IV., Figures 277 and 278, will suffice to furnish a guide to the operation in atypical cases.

FIGURE 286.



The sutures intended for closure of the perineum having all been introduced are now temporarily held down and away from the vulva as shown in this figure. This is to facilitate the passage of a special suture just back of the crown suture. As soon as this special suture has been passed, and before it is tied, the bundle of sutures is returned to its former position as shown in the next figure. The purpose of the suture now being passed will become apparent in the next two figures.

**After-treatment.** The patient is not catheterized unless unable to pass urine; she is permitted to lie in any position. The conventional roll under the knees and bandaging of the thighs are unnecessary except for the comfort of the patient.

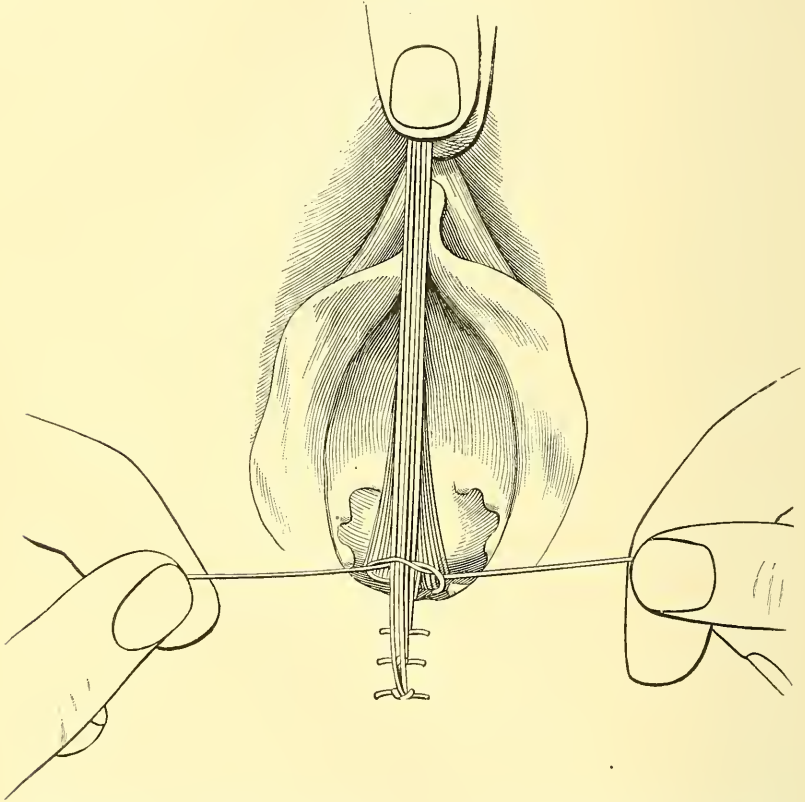
The external sutures should be removed in about ten days; the vaginal sutures in about sixteen. The removal of the latter is facilitated by the use of Sims' speculum reversed; that is, hooked under the pubes, the patient being on the back. During convalescence the

patient may lie in any desired position. When on the back the legs and thighs may be more comfortable if supported on a roll. A sterilized douche should be given every twelve hours, and the external parts showered off after urination or defecation. The wound is dressed antiseptically.

#### Other Operations.

The literature of the subject has been obscured by a countless variety of operations for the restoration of the perineum. Every medical

FIGURE 287.



The special suture introduced in the last figure is now being tied; its purpose is to secure in a bundle the other sutures and hold them down against the posterior wall of the introitus vaginae. The next figure will show all the sutures turned into the vagina. The special suture retains them there. The free ends of this retention-suture are carried with the others into the vagina.

student is appalled by their number, their diversity, and their complexity. It is hardly possible, however, that perineorrhaphy furnishes an exception to the great general principle that progress in any direction is always characterized by simplicity.

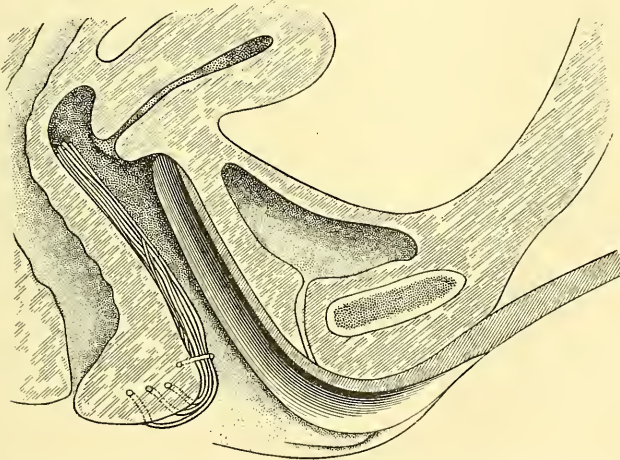
The object of perineorrhaphy is to replace rather than to enlarge the

perineum. Many of the popular stereotyped operations which enlarge it really exaggerate its displacement.

The surgeon is often asked what operation he does on the perineum. This implies that there is some fixed operation which is universally applicable. It would be no less absurd to ask what plastic operation would universally apply to lacerated wounds of the face. It is not enough to do some operation and get union, even though that union result in placing a solid mass of flesh where the perineum ought to be. Great harm comes if the parts brought together are not parts which belong together.

Most of the stereotyped operations are prized because they make the "large, solid, perineal body," but such a perineum, composed of the union of parts which do not belong together, may be unfit for the performance of its functions, and may be very prone to subsequent rupture.

FIGURE 288.



This sectional view of the sutures in position and tied completes the series of illustrations of the secondary operation for incomplete laceration of the perineum. The entire bundle of sutures is shown turned into the vagina, where they cannot irritate the wound. This arrangement permits adequate dressings over the external part of the wound and does away with the irritating and distressing ends of the sutures which are commonly left in contact with the external surfaces, and which always contribute enormously to the discomfort and pain of convalescence. A section of Sims' speculum is here shown. The instrument introduced in this way, *i. e.*, hooked under the pubis, with the patient in the dorsal position, facilitates the turning in of the sutures at the close of the operation, and may be again used in their removal at the end of about two weeks.

We hear much said about the great merit of this operation, or of that operation, or of the other operation, and of the claim that the "large, solid, perineal body" which it makes is an "improvement on nature." This is a radical and dangerous mistake. The large perineal body is contrary to nature, is unnecessary, is a disadvantage. The question is not of size, but of location. If the perineum, be it ever so small, is well up under the pubes its location at that point indicates that the muscles and fascia of the pelvic floor are performing their



function of supporting the pelvic organs. Let us have an end of the fallacy that the perineum supports the organs, because it is large, or, for that matter in a certain sense, that it supports them at all. By its location and integrity it only contributes to their support as an essential part of the pelvic floor. In its normal location and integrity it indicates that the pelvic floor is giving support to the pelvic organs, is doing its part in the prevention of their prolapse, is fulfilling its functions. A torn perineum properly situated may be adequate. An enormous perineum, if displaced toward the coccyx, may require operative treatment.

“When a thoroughly scientific and satisfactory treatise is written on the subject of perineorrhaphy it will not be an article describing the numerous and varied operations. It will treat, in a general way, of operating in such a manner as to restore the parts to the condition in which they were before they were torn. The first step must be to find the landmarks, and Emmet has told us how to do this by bringing together the lowest carunculæ myrtiformes on either side with tenacula; when this has been done one may discern the directions of the original rent and the cicatrices. On the correct observation of these landmarks will depend the method by which we must proceed to restore the perineal body so as to leave the vaginal outlet with an annular arrangement of the remains of the hymen. Failure to study these cases with the remains of the hymen as a guide accounts for the numerous methods of perineorrhaphy.”<sup>1</sup>

The greatest lesson in perineorrhaphy is to apply the elementary principle that, in the repair of a wound, the essential purpose is to restore the wounded part to its original state. Then always individualize each case, find out the lines of tear, their direction, their length, and then put the fragments back where they were before.

He who does this will do a different operation in every case, but he will do one man's operation—that man will be himself.

If one of the stereotyped operations in an individual produces a perfect result it will be not because it has anything like a universal adaptation to the repair of an injured perineum, but because it chanced to fit that case.

*The flap-splitting operation*, for example, usually results in the union of parts which were not together before the rupture, and cannot be united without detriment to the patient. It is often performed with little or no judgment and, since it is so easy that a tyro can do it, has become popular. The principle of flap-splitting, however, as applied to perineorrhaphy has great value in so far as it may enable the operator, in some cases, to readjust the fragments to their original relations. If used with skill and judgment, in some cases of deep injury to the fascia it serves a most useful purpose. Its broad application beyond this has done great and irreparable harm.

The buried suture in perineorrhaphy would be beyond criticism if its use were not occasionally followed by infection. Numerous operations in the hands of careful aseptic surgeons have resulted in suppura-

<sup>1</sup> Discussion by the writer on Dr. Hanks' paper on Lacerations Involving the Sphincter Ani. Transactions American Gynecological Society, 1890, p. 257.

tion, burrowing of pus, the formation of recto-vaginal and recto-perineal fistulæ, and in dangerous sepsis. The advantages of the buried over the ordinary interrupted suture which is tied on the surface do not outweigh this danger.

### Complete Perineorrhaphy.

Perineorrhaphy involving the sphincter ani muscle differs in some details from the operation just described: first, in the preparatory treatment; second, in the denudation; third, in the passage of the sutures; fourth, in the after-treatment.

**Preparatory Treatment.** The chances for union of the wound are increased by limiting the amount of feces passed over it during the first few days following the operation; hence the bowels should be as nearly empty and aseptic as practicable. With this object they should be treated as in the preparation for an abdominal section. See page 42.

**Denudation.** Figure 289 shows the rent extending up into the recto-vaginal septum. At points *m* and *m* are two pits or depressions caused by the retraction of the ends of the sphincter ani muscle. The principal object of the operation is the union of these ends and the consequent restoration of the sphincteric function. The denudation must, therefore, include the pits or depressions. They may be seen, though not always without careful search, at either side of the anus. The denudation starts just below the pit on the patient's left, and is carried around on the margin of the torn recto-vaginal septum to include the opposite pit.

A common fault in denudation is not to include these torn ends of the sphincter. Observe carefully that they are situated well down on a level with the posterior margin of the anus. Failure to carry the denudation well below them would clearly defeat the object of the suture. The remaining denudation is then done as for an incomplete rupture.

**Passing of the Sutures.** The sutures should be of silkworm-gut. The first two or three should be introduced to the left of the anus, should pass somewhat deeply under the left pit, as shown in Figure 290, should sweep around under the border of the torn septum and pass under the opposite pit and emerge to the right of the anus. Figure 291 shows the ends of the sphincter united by the three lower sutures. The problem is now simplified to that of an incomplete operation, and the remaining sutures are placed as already described for the closure of an incomplete laceration. The sutures having been tied, are all turned into the vagina, as shown in Figure 288, and the vulva is protected by an aseptic gauze dressing.

**After-treatment.** A full cathartic of castor oil or compound licorice powder should be given on the third day, and repeated, if necessary, to secure a free action. Excessive catharsis, producing frequently repeated liquid stools, might set up irritation of the anus sufficient to prevent healing, and should therefore be arrested by the use of opium or morphine. After the first movement of the bowels the

stools should be kept semi-fluid. This may require a cathartic at intervals of not more than two days. During the first week, whenever

FIGURE 289.

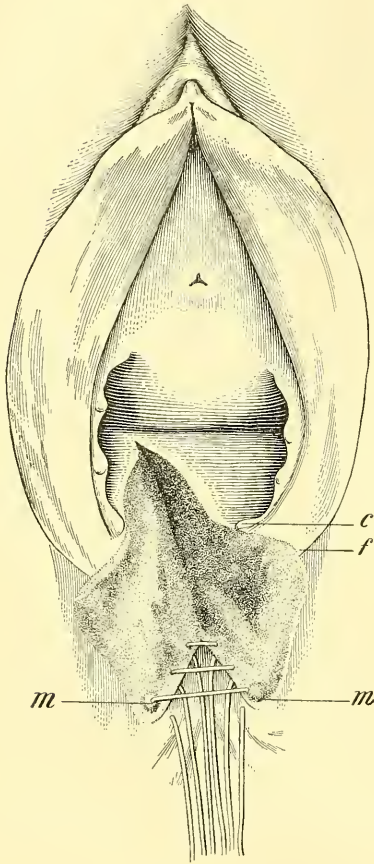


FIGURE 290.

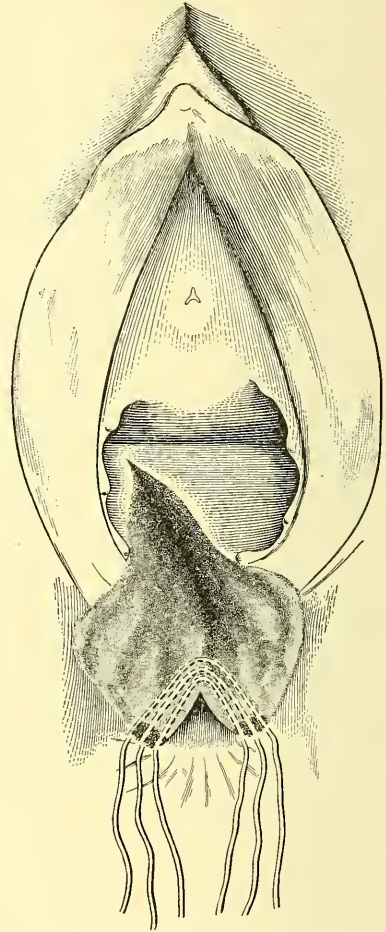


Figure 289.—Faulty method of passing the anal sutures. Interrupted sutures placed in this manner and tied on the anal side of the wound are open to the following objections: 1. They make a long line of union which is exposed to the hostile environment of the bowel. 2. The knots and free ends of the suture in the bowel may take up septic secretions and carry them by capillary attraction to the deeper parts of the wound, and in this way cause infection and failure of union. 3. A long line of union is difficult to protect against infection.

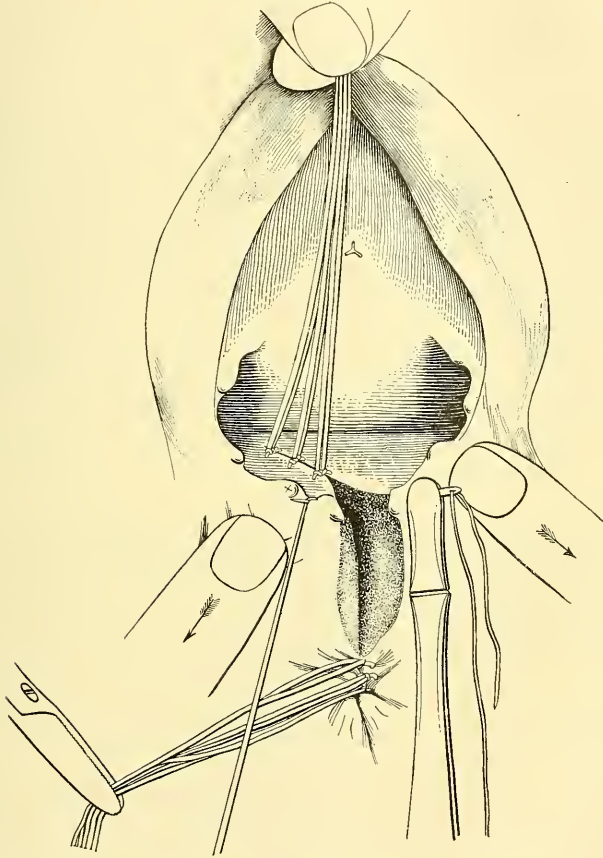
Figure 290.—The purse-string method of suture. This draws the wound into a small compass; it leaves no part of a suture in the bowel to absorb and carry septic secretions; the inner angle of anal portion of the wound is drawn down to the margin of the anus, where it is less liable to infection than if the wound were longer and exposed to the interior of the bowel. Experience has shown that this method of suture is immeasurably more successful in securing primary union than that shown in Figure 289.

the bowels are about to move, it is well to give a rectal enema of eight ounces of olive oil. In giving the enema the syringe-tip should be care-



fully passed along the posterior wall of the anus away from the anal sutures. Carelessness at this point may break open the newly united surfaces and destroy the result.

FIGURE 291.



This represents the repair of a complete perineal laceration extending a short distance into the right lateral sulcus of the vagina. The three sutures which reunite the ends of the sphincter ani muscle are tied and held to one side by the forceps. Vaginal sulcus closed with three stitches which are tied and held up by the assistant. The needle is being introduced for the passage of the crown stitch which unites the lowest caruncles. There is no rectocele in complete lacerations; hence the crown stitch does not include it. The remaining sutures to be passed will close the external part of the wound. Observe that the folds about the restored anus radiate in all directions instead of downward, as in the previous figures. This is a reliable indication of the adequacy of the anal sutures. The fingers hold the vulva open and expose the intravaginal sutures which would otherwise be out of sight.

If there is no suppuration the sutures should not be removed until about the fourteenth day. In other respects the after-treatment is the same as for incomplete laceration.

## CHAPTER XLII.

## PUERPERAL LACERATION OF THE CERVIX UTERI.

## Literary History and Priority.

THE credit of having established the pathological significance and surgical treatment of laceration of the cervix uteri belongs to Emmet. His three original communications<sup>1</sup> not only contained the first practical information on the subject, but, what is more remarkable when we consider the great frequency and the far-reaching pathological results of the lesion, the information which they contained was at once so complete, so accurate, and so adequate that little if anything of importance has since been added.

Vague allusions to the subject had from time to time appeared before the publication of Emmet's papers, but only to record the fact that such an injury could result from parturition. They contained little account of its pathological significance and none of its surgical treatment.<sup>2</sup>

## Causes.

The causes of laceration of the cervix uteri are these :

1. Relative disproportion in size between the child and the cervix.
2. Rigidity of the cervix.
3. Rapid second stage.
4. Any disease of the cervix which causes friability and impairs elasticity.
5. Instrumentation.
6. Meddlesome manipulation, such as manual dilatation of the cervix to hasten labor.

The cervix is not fully prepared for dilatation and the transmission of the child until the end of the normal period of gestation; hence the greater liability to injury in premature and immature labor. Abortion in the earlier months of pregnancy is not a frequent cause of laceration, except as it may result from forcible dilatation. A greatly prolonged labor may, by continued pressure, induce nutritive changes and thereby decrease the elasticity and increase the liability to rupture. This condition is an approach to pressure necrosis.

## Pathological Anatomy and Results.

At the outset let the important fact be clearly kept in mind that the injury is usually more extensive in the surrounding vaginal structures

<sup>1</sup> Surgery of the Cervix Uteri. American Journal of Obstetrics, February, 1869. Laceration of the Cervix Uteri as a Frequent and Unrecognized Cause of Disease. *Ibid.*, Nov., 1874. The Proper Treatment of Lacerations of the Cervix Uteri. American Practitioner, January, 1877.

<sup>2</sup> The Causes and Treatment of Sterility. Gardener, 1856. Cicatricial Ectropion of the Cervix. W. Roser. Archiv für Heilkunde, 1861, ii. S. 97.

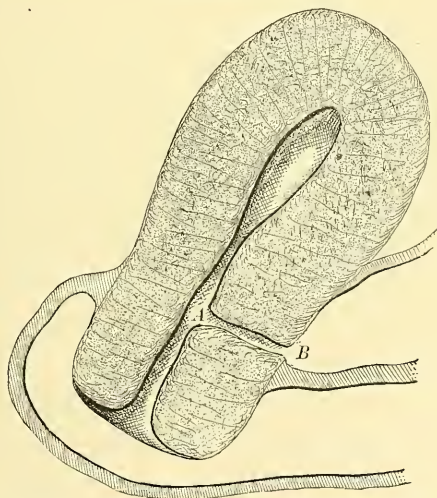
than in the cervix proper. This is, perhaps, contrary to the usual notion ; but an examination of what follows on the state of the cervix before, during, and after labor, and the careful diagnostic study of cases will demonstrate this fact.

The diameter of the non-pregnant uterus is about one-fifth of an inch. This must be increased at delivery to correspond to the diameter of the child's head ; it is, therefore, not surprising that some degree of laceration occurs in the majority of labors. The lesion, however, is generally slight and heals so readily and rapidly as to cause little or no pathological result.

The Directions and Extent of cervical laceration vary within the widest limits—*i. e.*, the cervix may tear in any direction and to any extent. The usual directions are : anterior, posterior, and lateral.

*Anterior and posterior lacerations*, especially the former, usually heal spontaneously, and are, therefore, seldom clinically observed. This healing is explained by the anatomical arrangement of the vaginal walls, which tends to keep the torn fragments in close contact while union is taking place.

FIGURE 292.



Vesico-uterine fistula at angle of laceration. Fistulous tract after partial healing of an anterior laceration.<sup>1</sup>

*Anterior laceration* in rare instances may extend so far as to invade the bladder and make a vesico-utero-vaginal fistula. In such a case, if attention be paid to cleanliness, considerable spontaneous healing usually follows. There may be left, however, a small vesico-vaginal fistula at the utero-vaginal attachments, or a vesico-uterine fistula at the angle of the laceration, extending from this part of the cervical canal into the bladder.

*Posterior lacerations*, extending into the posterior vaginal pouch, may open the door for post-uterine infection, and thus give rise to

<sup>1</sup> After Emmet. Principles and Practice of Gynecology.



contracting cicatricial bands; these may draw the uterus downward and backward and fix it in an intractable retroversion or retroflexion. A variety of distressing and disabling functional disturbances, including menstrual disorders, sterility, and extension of the infection to the parametria and the peritoneum, are the least serious results which may be expected from this condition.

*Lateral lacerations* occur most frequently to the left, less frequently to the right and left, least frequently to the right.

**The False Cervix.** Nature, instead of repairing the injury of a lateral laceration, resorts to a deception so artful that, until exposed by Emmet, the lesion had been practically an unknown factor in uterine pathology. By this deception a false cervix, composed chiefly of out-rolled intra-uterine and reduplicated vaginal tissue, is substituted for the normal cervix. The evidence of laceration—that is, the irregular, fissured, uneven appearance—is so obliterated that even the practised eye may fail to recognize it. If diagnosis between the normal and the lacerated cervix were solely dependent on sight, cases would commonly arise in which increased size, congestion, and erosion would be the only diagnostic signs.

*The condition of the cervix before, during, and after labor*, as laid down in the following statement,<sup>1</sup> has a determinating influence upon the immediate mechanical results of laceration.

*Before labor*, from the moment of the pregnancy, the cervix, as well as the body of the uterus, enlarges to accommodate the growing fœtus. The entire cervix from the first, except a small part which surrounds the external os, expands symmetrically with the body above. This expansion early in pregnancy obliterates the internal os, and converts the entire cervix into an inverted cone which projects into the vagina and whose walls are continuous with those of the corpus. Thus, long before term, a very large part of the fœtal covering is composed of evolved and expanded cervical tissue.

*During labor* there will be some plane in the cervix above which the muscular wall of the uterus contracts, and below which it dilates, for the expulsion of the child. Examination after delivery shows a hard, contracted, unyielding ring. This has sometimes appeared to the examiner to be the contracted external os. It is, however, above the plane of the external os, perhaps even above the utero-vaginal attachment. The plates of Braune, drawn from frozen sections of the gravid uterus, show the remnants of the internal os to be on a plane far above this contracted ring. It is, therefore, neither the contracted internal nor external os, but is situated between the two, and is the lowest margin of the contracted part of the uterine wall. It is a temporary intracervical os below which one must look for that part of the cervix which during labor was compelled to undergo excessive dilatation, and expect there to find laceration if it be present.

Without care this lowest part of the cervix, which has been so stretched that it cannot immediately recover its contractile power, will be entirely overlooked. It can, however, always be felt projecting into the vagina

<sup>1</sup> John Bartlett, Chicago Medical Journal, October, 1873. Wilhelm Braune. Atlas of Topographical Anatomy, Leipsic. Translated by Belamy. Philadelphia, 1877.

as a "flabby, floating collar" not unlike a "section of large intestine," and as wanting in contractile power as the sphincter ani muscle after extreme forcible dilatation by the method of Van Buren.

After normal labor this lowest portion of the cervix slowly recovers its contractile power, and in a few days resumes its normal shape, and the external os is thereby restored.

If bilateral laceration occur, nature has all the conditions for the formation of the false cervix already mentioned. The anterior and posterior diverging flaps are at once forced in the directions of the least resistance, the former forward toward the vaginal outlet, the latter backward into the posterior vaginal fornix. The congested tissues about the temporary os, which in the foregoing paragraph have been called intracervical, meeting no resistance, now roll out. This eversion gives rise to obstruction in the uterine circulation. The intracervical structures, thus engorged and swollen, no longer have sufficient space for their accommodation within the uterus; hence the eversion continues until tissue enough for the formation of the false cervix has been rolled out into the vagina and until the temporary intracervical os may actually have usurped the place of the now destroyed os externum. This everted intracervical mucosa now rolled out into hostile surroundings becomes infected, and the infection may extend along the mucosa to the endometrium, Fallopian tubes, peritoneum, and ovaries, or by continuity of the deeper tissues to the myometrium, perimetrium, or parametrium. Laceration of the cervix, therefore, supplemented by infection, may open the door to extensive pelvic disease.

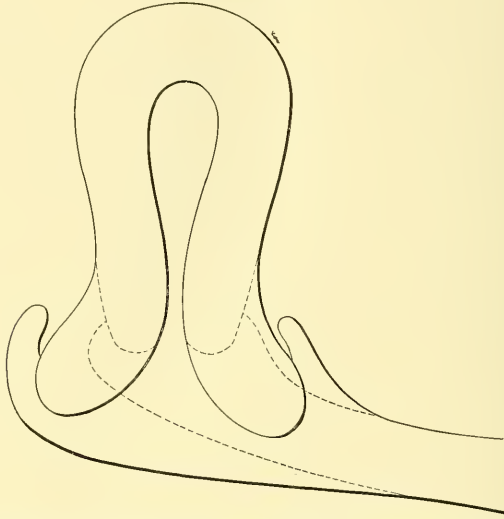
**Subinvolution.** The physiological hypertrophy of pregnancy, which ought to subside after labor, may, under the influence of infection, fail to do so, and become pathological. Hence the uterus remains enlarged; this enlargement, called subinvolution, is a very common result of laceration. It usually pertains more to the cervix than to the corpus uteri. See page 210.

**Descent and Vaginal Reduplication.** When the patient assumes the upright position the supports of the heavy congested subinvolved uterus are inadequate to hold it on the health level; it settles by its own weight to a lower level and carries with it a reflected fold of the vaginal wall. See Figure 297. The vaginal portion of the cervix is thus made apparently much longer than it really is. The soft, easily-moulded, out-rolled intra-uterine tissue and the reflected vaginal walls may completely obliterate the fissure which is commonly regarded as the evidence of laceration; upon ordinary examination, therefore, the tear may be entirely overlooked. The deception may be exposed by placing the patient in the knee-breast position. The uterus, by its own weight, will then be carried toward the diaphragm; the vaginal wall will unfold and disclose the true utero-vaginal attachment, and not uncommonly a deep laceration may be seen extending on either side far into the vaginal walls.

When the laceration is confined to one side the deception is even greater, for, as shown by Emmet, the fundus in such cases is usually drawn toward the affected side by inflammatory contraction of the nearest broad ligament. The effect of this lateroversion is to raise the

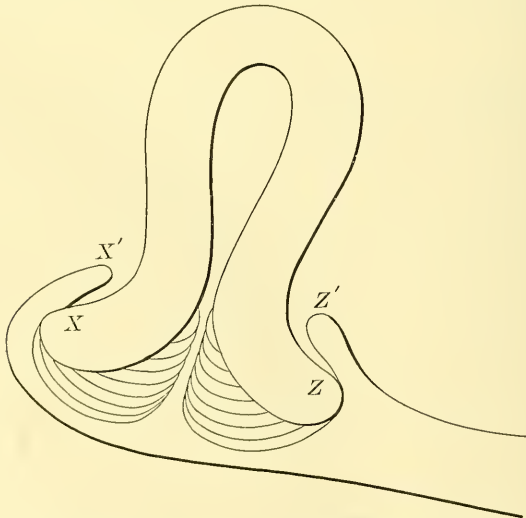
uninjured side of the cervix a trifle higher in the pelvis and correspondingly to depress the injured side, thereby causing a reflection of the vaginal membrane on the depressed side, so that, as in the bilateral

FIGURE 293.



The widely separated lips of the recently lacerated cervix. The posterior lip is crowding backward into the posterior vaginal fornix, the anterior lip forward toward the vaginal outlet. The dotted lines show the contour of the uterus and vagina before the laceration. The location of the temporary intracervical os is at the bottom or angle of the laceration.

FIGURE 294.

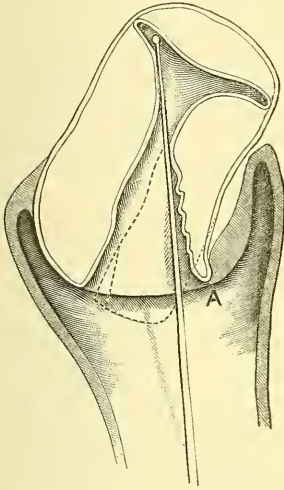


Shows the circular enlargement of the cervix due to out-rolling of the intracervical tissue, and the apparent elongation due to reduplication of the vaginal walls. The actual utero-vaginal attachment is at X and Y. The reduplication makes it appear to be at X' and Y'. See Figure 344.



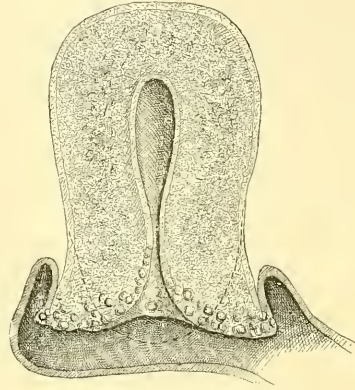
injury, the apparent os externum may seem to be in the very centre of the cervix when it is really on one side. To add to the confusion the sound, entering at the side, may, though passing to the horn of the opposite side of the uterus, appear to pass in the median line.

FIGURE 295.



False cervix in unilateral laceration. Obliquity of the uterine axis from contraction of broad ligament.<sup>1</sup>

FIGURE 296.



Double laceration, showing enlarged mucous follicles.<sup>2</sup>

**Cystic Degeneration.** Puerperal laceration of the cervix thus causes marked out-rolling of intra-uterine tissue and consequent permanent, passive congestion. The delicate intra-uterine membrane, instead of being in contact with the milder alkaline secretion of the uterus to which it is accustomed, is in contact with the irritating acid secretion of the vagina. But the mischief does not end here. The uterine supports soon prove still more unequal to the work of sustaining in position the uterus, now heavy from congestion, and it falls still lower in the pelvis. The everted membrane, in contact with the posterior vaginal wall, and constantly bathed in the vaginal secretions, is subject, by reason of the normal movements of the uterus, to the additional irritation of friction. An erosion forms, and the mucous follicles, Bartholin's glands, estimated by Tyler Smith<sup>3</sup> to number ten thousand in the normal virgin cervix, become diseased. Some of them pour out the familiar thick, colorless, viscid, ropy secretion. Others, in consequence of adhesive inflammation which has occluded their outlets, become distended by their own secretion and undergo cystic degeneration. These cysts are generally present, frequently in large numbers. Subinvolution, including enlargement of the bloodvessels, is a natural sequence of these changes.

<sup>1</sup> Emmet's Principles and Practice of Gynecology.

<sup>3</sup> On Leucorrhœa, American edition, p. 38.

<sup>2</sup> Ibid.

**Composition of the False Cervix.** As already outlined, the false cervix is composed of :

Everted intra-uterine tissue.

Reflected vaginal wall.

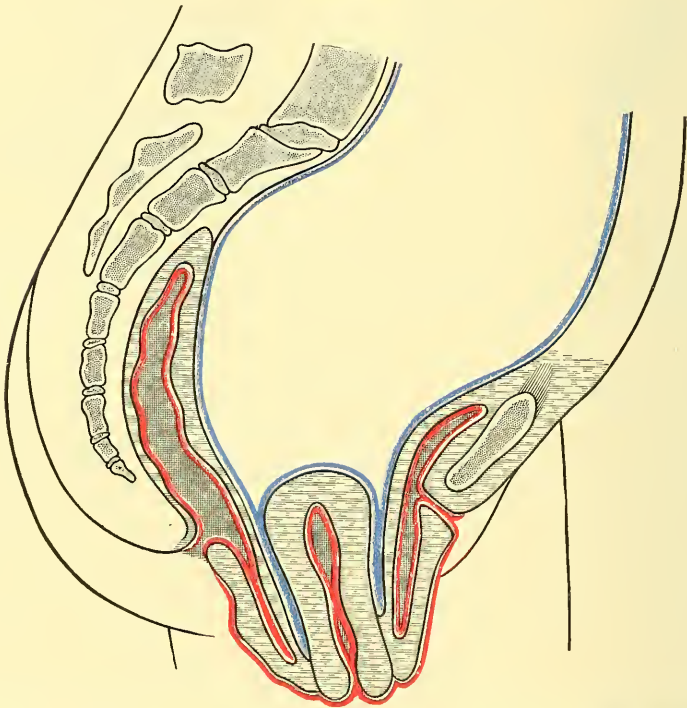
Cervical follicles which have undergone cystic degeneration.

Congested and inflamed mucosa and submucosa.

Enlarged bloodvessels.

**Apparent Hypertrophy and Elongation of the Cervix.** Cases are frequent in which there is an apparent lengthening of the cervix, so that it extends from the utero-vaginal attachment even to the vulva. This condition is usually described as hypertrophic elongation of the cervix. Credit for the true explanation of this condition belongs to Emmet. Figure 297 shows the os externum outside the vulva. This

FIGURE 297.



Extreme reflection of the vaginal walls over a prolapsed uterus, giving the false appearance of elongation of the cervix.

is not because the infravaginal portion of the cervix has lengthened by hypertrophy so as to occupy the entire length of the vagina, but because the entire uterus has prolapsed until the os externum has appeared at the vulva. If the patient be placed in the knee-breast position and the uterus be made to gravitate toward the diaphragm, the reflected vagina will be unfolded, the cervix will resume its normal distance from the vulva, and the utero-vaginal attachment will appear at its

proper distance from the os externum—that is, the normal relations of the vagina and uterus will be restored.

Apparent elongation occasionally takes place in the nullipara, but is very commonly associated with descent of the lacerated cervix. The extent of laceration will be apparent in proportion to the degree of eversion—that is, in some cases the evidence of laceration, as already explained, is obliterated by the out-rolled intra-uterine tissue; in other cases of less eversion, the laceration is more apparent. A striking illustration of the latter class of cases is furnished by the following case:

Superficial examination suggested the presence of two large uterine polypi, one filling the anterior and the other the posterior half of the vagina, both reaching to the vulva; further examination disclosed the

FIGURE 298.

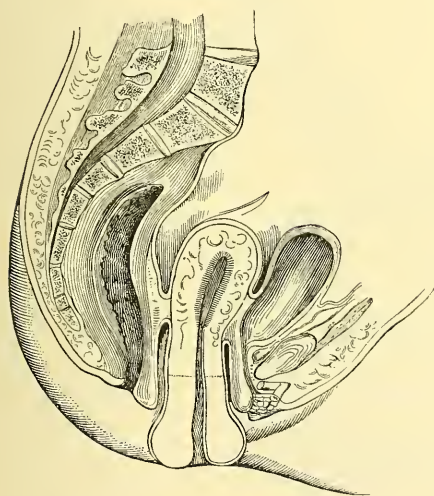


FIGURE 299.

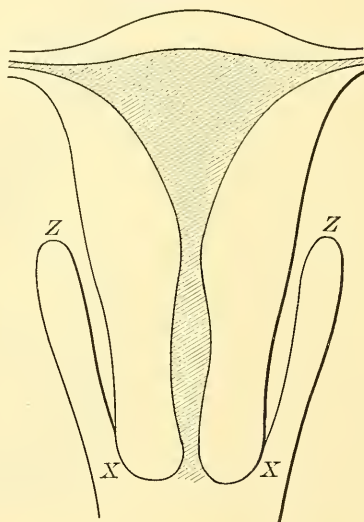


Figure 298.—This figure is here reproduced from a standard book, in which it was used to represent supposed infravaginal hypertrophy of the cervix. The vaginal attachment, however, is only apparent and is really due to a reflection of the vaginal wall. The true utero-vaginal attachment is shown at X and X of Figure 299. Figure 297 is a correct representation of the real condition.

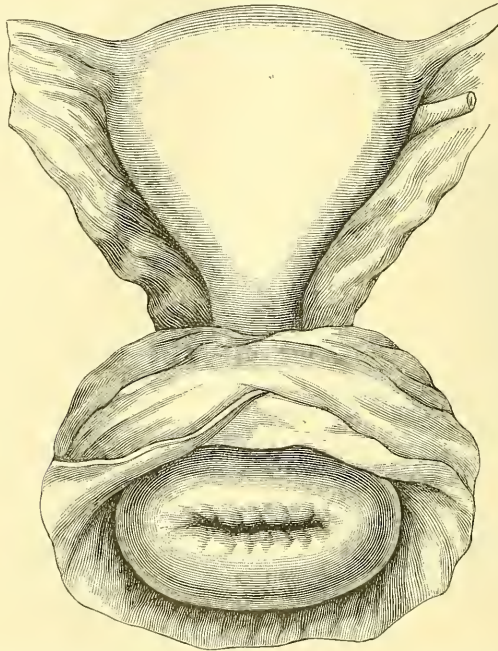
Figure 299.—Shows the true utero-vaginal attachment at X and X, and apparent utero-vaginal attachment at Z and Z. See same Figure under 345.

apparent presence of extreme hypertrophy of the anterior and posterior lips of the cervix. Between these two lips was a deep fissure extending into the vagina for at least two inches. With this diagnosis the patient had been sent to the hospital for amputation of the supposed “hypertrophied cervix.” Upon placing the patient in the knee-breast position, however, the uterus gravitated toward the diaphragm; the utero-vaginal attachment appeared in its true relation, and it was plainly to be seen that, instead of hypertrophic elongation of the infravaginal portion of the cervix, some degree of atrophy had actually taken place, for the utero-vaginal attachment was nearer to the external os than normal. There was a deep fissure disclosing an enormous



bilateral laceration, which extended for two inches into a subinvoluted uterus and far out into the vaginal walls on either side. Closure of the cervix was promptly followed by the disappearance of all pseudo-elongation, both in the infravaginal and supravaginal portion of the cervix, and in a few weeks by complete subsidence of the subinvolution. In another similar case of unilateral laceration, with extreme eversion, the apparently elongated cervix showed no fissure, but, on the contrary, was symmetrical.

FIGURE 300.



Shows supravaginal elongation of the cervix. Post-mortem specimens frequently show elongation of the cervix which did not exist during life; hence the observation should always be made upon the living subject. Observe in this specimen the atrophic narrowing of the supravaginal portion. This condition, except as observed post mortem, is uncommon.<sup>1</sup>

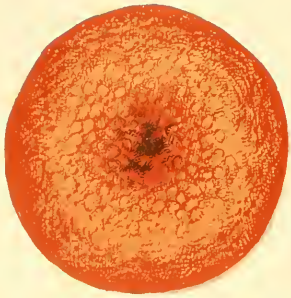
The explanation of apparent hypertrophic elongation and circular enlargement of the cervix need no longer rest upon the authority of Emmet; it has been abundantly verified by a large number of other competent observers. The subject will be further considered under Descent of the Uterus.

Amputation of the cervix or hysterectomy for so-called "hypertrophic elongation" and "hypertrophic enlargement of its circumference" are favorite operations in gynecology. The true pathology of this condition would, however, demand not amputation or hysterectomy, but closure of the cervix, if lacerated, and the appropriate treatment for displacement.

<sup>1</sup> After Courty, in Bonnet et Petit, Gynecology.



PLATE I.



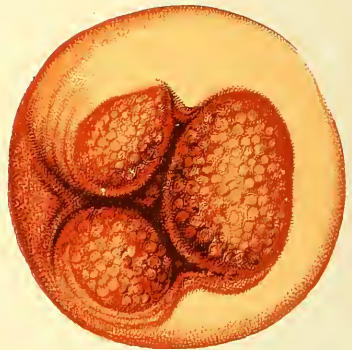
Granular Erosion of Cervix.



Cystic Degeneration after Laceration.



Deep Stellate Laceration.



Stellate Laceration with Ectropium and Cystic Disease.



Crescentic Laceration with Erosion of one Lip.



Deep Destructive Laceration up to Inner Os.

LACERATIONS OF CERVIX.<sup>1</sup>

<sup>1</sup>After Mundé, American Journal of Obstetrics, 1879.



PLATE II.



Unilateral Laceration beyond Vaginal Insertion.



Stellate Fissure with Erosion.



Double Laceration with Erosion.



Double Laceration beyond Vaginal Junction.



Bilateral Laceration, Great Erosion and Cicatricial Induration.



Cystic Disease Implanted on Lacerated Cervix, Simulating Epithelioma.

LACERATIONS OF CERVIX.<sup>1</sup>

<sup>1</sup>After Mundé, American Journal of Obstetrics, 1879.



The existence of genuine hypertrophic enlargement and elongation of the cervix is not absolutely denied; it is, however, of extremely rare occurrence, so rare that amputation of the cervix, except the removal of certain diseased portions, as will be explained in the operation for lacerated cervix, should become practically obsolete. In carcinoma of the cervix and in extreme inflammatory infection of the uterus, not amputation of the cervix, but hysterectomy is the operation of election.

When hypertrophic elongation of the cervix does exist it is above the utero-vaginal attachments, and is, therefore, supravaginal. Infravaginal elongation of the cervix, which is below the utero-vaginal attachment, is often apparent, seldom or never real.

**A Cause of Carcinoma.** Emmet first observed the relatively more frequent development of cancer upon the lacerated cervix and the almost entire absence of it from the nulliparous cervix. Benign adenoma is apparently a pathological connecting link between glandular endometritis and malignant adenoma. Malignant adenoma is cancer; hence a possible pathological sequence from cervicitis due to laceration, and cancer is established. We may not, strictly speaking, attribute cancer to laceration of the cervix, but we must not ignore the fact that glands of the lacerated cervix are a fruitful soil for malignant disease.

There are certain congenital and acquired conditions which closely simulate laceration of the cervix. Such conditions, especially when they occur in the virgin, should for obvious reasons be distinguished from puerperal laceration. They do not, as a rule, present cystic degeneration or extreme cervical eversion.

### Symptoms.

Immediately after the accident occurs arterial hemorrhage may be so profuse as to demand prompt ligature and suture. The secondary symptoms are those of the pathological results of the lesion—that is, the symptoms of endometritis, metritis, subinvolution, and displacements. The menorrhagia and uterine discharges so common in laceration are the symptoms of hemorrhagic and catarrhal or purulent endometritis. A variety of nervous symptoms, such as may be due to faulty innervation and nutrition, have been attributed to laceration of the cervix. They include neuralgic and other pains in remote parts, dyspepsia, indigestion, constipation, menstrual disorders, backache, and headache. Bearing-down sensations and difficulty of walking and standing are among the results of the associated displacements of the pelvic floor. These displacements include the uterus, its appendages, the bladder, vagina, and rectum.

Cicatricial narrowing of the uterine canal at the angle of the laceration may be so extreme, either from natural contraction or from the use of caustics, as to reduce the uterine outlet to a mere pinpoint. This reduction of calibre results in imperfect drainage of uterine secretions. Endometritis and numerous functional disturbances, including sterility, dysmenorrhœa, menorrhagia, and amenorrhœa, are common sequels.

Emmet lays great stress upon the reflex irritation produced by the cicatricial plug in the angle of the laceration. The cicatrix develops



there either by an effort of nature to close the gap, or by the injudicious application of caustics. He cites numerous cases in which excessive neuralgia in distant organs, for example, neuralgia in the eyeball, has promptly disappeared upon the repair of the laceration. He attributes this reflex irritation to the inclusion and pinching of nerve filaments in the cicatrix, as in sensitive stump after amputation of the leg or arm. The cicatrix, therefore, may serve as a constant and hidden cause of nerve irritation. The anæmic, nervous, neuralgic state is peculiarly liable to be associated with cicatricial cervix. Whatever may be the explanation of the facts, the clinical observations of Emmet have been verified by numerous observers.

The brief report of two cases will serve to illustrate: A patient consulted one of the most distinguished ophthalmologists in America for a long-standing, severe, and obstinate neuralgia of the eyeball. As the only possible means of relief extirpation of the eye was finally advised; this operation the patient declined, and the pain continued. She was subsequently operated upon by Dr. Emmet for laceration. In the operation he removed a large, wedge-shaped piece of cicatricial tissue from the angle of laceration, which nature, in the vain attempt to bridge over the gap, had placed there. Immediate and permanent relief from the neuralgia followed.

In April, 1878, the writer performed a similar operation upon a woman who had for years suffered from almost constant pain in the top of the head. Up to the time of the operation every resource of treatment had failed. In this case the cervix was not eroded, but from the perseverance of some one in making caustic applications it had suffered considerable loss of substance. The indurated tissue was very marked and abundant, so that in its thorough removal an unusual amount of cervix was sacrificed. The pain disappeared from the time of the operation and has not returned.

Clinical observation has shown sterility and repeated abortion to be very frequently associated with laceration of the cervix. The pathological results of laceration already detailed furnish a clear explanation of these facts.

#### Diagnosis.

Laceration of the cervix, until demonstrated by Emmet, was known only by its effects. To designate the extent and character of these effects, the following names were applied: *Erosion, follicular erosion, granular erosion, papillary erosion, granulation, excoriation, ulcer*. Erosions, when exaggerated, were called *coxcorn granulations*; when the exaggeration was so extreme as to suggest malignant disease, it was sometimes called *cauliflower excrescence*, a name loosely used also in cancer. Inflammation of the cervical follicles, analogous to follicular pharyngitis, suggested the name *follicular erosion*.

The older text-books usually devoted a chapter to this subject under the head of Ulceration of the Womb. The disease is really not ulceration, but erosion. Ulceration, except in specific and malignant disease, is rarely found on the cervix. Thomas, in his work on *The Diseases of Women*, apologized for the use of the word, and said: "What is called

ulceration of the cervix is called erosion or granular degeneration when it appears under the eyelids.”

The presence, after parturition, of a part or all of the elements which compose the false cervix—that is, enlargement, erosion, eversion, patulous os, and cystic degeneration—is strong evidence of laceration; cystic degeneration of the mucous follicles is almost pathognomonic of laceration. The little cysts, varying in size from that of a pinhead to that of a small marble, feel to the touch like small shot scattered throughout the mucous tissues of the everted cervix. They are rarely found

FIGURE 301.

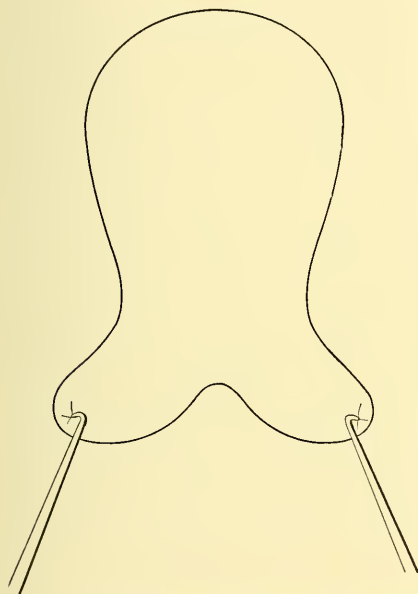


FIGURE 302.

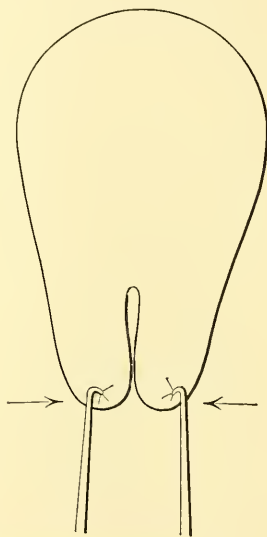


Figure 301.—Showing everted, lacerated lips caught by tenacula and held apart.  
Figure 302.—Showing lacerated lips caught by tenacula and rolled in.

except on the lacerated cervix. As already explained, they are the result of occlusion and cystic degeneration of mucous follicles, the glands of Bartholini. These follicles, except in cases of abnormal distribution, are entirely confined to the intracervical mucous membrane, and are not prone to cystic degeneration unless rolled out into the hostile environment of the vaginal secretions. This out-rolling seldom occurs except as the result of laceration. Hence cystic degeneration without laceration must be extremely rare.

The lesion, in ordinary cases, may be detected by touch and sight. Intelligent study of all cases and accurate diagnosis in the more obscure require the cervix to be exposed by a Sims or a Simon speculum, and the everted lips to be caught and rolled in by means of two uterine tenacula, one in each hand.

For complete diagnosis, in many cases, the tenacula are absolutely essential. With these instruments Emmet first untied the knot and

revolutionized the pathology and treatment of this cervical disease. The late Dr. Peaslee, referring to the large number of cases of so-called ulceration, said<sup>1</sup> "that they were not recognized, for none of us knew anything about them till Dr. Emmet told us. It was he who, in a happy moment, brought the anterior and posterior surfaces together with tenacula, and instantly demonstrated that what we all supposed an ulceration was nothing more or less than a laceration."

The following quotation from Emmet's first systematic paper on this subject<sup>2</sup> presents a graphic picture of the gynecology of the last generation :

"November 27, 1862, I first operated for the relief of a double lateral laceration of the cervix by freshening the surfaces and bringing together the anterior and posterior flaps with interrupted silver sutures. This patient had been an invalid for several years before coming under my care, and had been treated for menorrhagia and hypertrophy of the uterus, with an extensive erosion. She was undersize, of a naturally delicate constitution, and after a severe and protracted labor, with difficulty had given birth to a large child. Her general appearance indicated incipient phthisis, but no evidence of a tuberculous deposit could be detected. The uterus was some four inches in depth, and an erosion extended about two inches in diameter over an enormous cervix. With great care this erosion had been healed several times, by maintaining the recumbent position for a sufficient length of time, but a relapse to the former condition recurred in every instance shortly after beginning to exercise by walking. I had almost despaired of being able to offer her any permanent relief, and attributed my want of success to the condition of her general health. While making a digital examination one day I was puzzled to account for the greater width of the cervix in comparison to that of the body beyond, a condition I had for the first time appreciated. I placed her on the left side and, with Sims' speculum, brought the cervix in view. I drew the posterior lip forward toward me with a tenaculum, but with no special purpose, when I was surprised to observe that it had decreased to nearly half its previous size. On lifting up the anterior lip with a tenaculum in the other hand, so as to bring the two portions into approximation, the outline of a cervix presented, of nearly normal size. The difficulty was at once apparent, for the parts had rolled back within the uterine canal, and a deep lateral fissure became evident, which extended on each side entirely through the cervix and beyond the vaginal junction. On separating the flaps and forcing them back to their former position, I saw the tissues gradually roll out, and the cervix again present its previous appearance. There could then be detected no appearance of laceration, and with the reduplication of vaginal tissue over the sides of the uterus, as I have already described, the cervix presented a normal length above its apparent junction with the vagina. The remedy at once suggested itself; the operation was performed with the

<sup>1</sup> Remarks after the reading of a supplementary paper on "The Proper Treatment of Laceration of the Cervix Uteri," by Dr. Emmet, before the New York County Medical Society, December, 1876. *New York Medical Journal*, January, 1877.

<sup>2</sup> "Laceration of the Cervix Uteri as a Frequent and Unrecognized Cause of Disease." *American Journal of Obstetrics*, November, 1874.



aid of my assistant, Dr. G. S. Winston, and I believe Dr. T. G. Thomas was also present. On completing the operation the uterus was five inches in depth; it rapidly reduced in size, and in time all evidence of local disease subsided, but she never entirely regained her general health. Some seven years after the operation Dr. F. N. Otis, of New York, her family physician, detected a tuberculous deposit, and she died of phthisis within a few months, having been ten years under my observation. For two years previous to her death she had resided abroad, but, as a friend, I was kept advised of her condition, and she continued free from uterine disease. I am fully satisfied that at the time of the operation her condition was so critical that it would have been but a question of a few weeks before a tuberculous deposit would have taken place. Although she never recovered fully the loss of vitality to which this injury had reduced her, yet her life was beyond question prolonged many years by the operation."

After the reading of this paper before the New York County Medical Society, September, 1874, Dr. J. Marion Sims said :

"When I went abroad in 1862, among the patients I turned over to the care of Dr. Emmet was the lady whose case forms the basis of the paper he has just read. She belonged to the upper walks of life, and had been under my charge for twelve or eighteen months. I remember the peculiarities of her case, so well described by Emmet, as vividly as if it were but yesterday. The bilateral lacerations of the cervix, and the consequent eversion of the hypertrophied, congested cervical mucous membrane, constituted at that time a difficult problem to solve. During the whole time that I observed this case no benefit resulted from local treatment, and I am sure that nothing short of the method so successfully adopted by Dr. Emmet could have been of the least service to her. I now only wonder that this operation had not been worked out sooner. When the perineum is lacerated the necessity for its reconstitution is self-evident, and it is singular that the necessity for reconstituting the integrity of a lacerated cervix did not sooner force itself upon the surgeon. The operation as devised and practised by Dr. Emmet is as simple, as safe, and as certain in its results as is the operation for a simple case of vesico-vaginal fistula. The same principles underlie each. The same free denudation of tissue, the same method of suture, the same after-treatment, and the same security from danger belong to both alike.

"I have performed the operation often enough to speak in positive terms of its value. The discussion of the subject must, of necessity, be one-sided. There can be no objection, no opposition to the operation. We must accept it as Dr. Emmet has given it to us. We cannot modify the operation; we cannot change it; we cannot improve it—for it is perfect; perfect in its method and perfect in its results.

"We owe to Dr. Emmet a debt of gratitude for this valuable contribution to uterine surgery. Like all new operations it is likely to be abused, but the time will soon arrive when it will assume its place in the foremost rank of useful improvements."

After the subject had been discussed by other members of the society, Dr. Marion Sims rose again, and said: "I am personally so

impressed with the importance of Dr. Emmet's paper in a practical point of view, and so pleased with the manner in which he has presented it to our consideration, that I beg leave to move a formal vote of thanks to Dr. Emmet for his most valuable contribution to surgery."

#### Differential Diagnosis.

There is a form of erosion due to endometritis, dependent upon an irritating discharge from the endometrium or vagina, apt to occur in feeble and badly-nourished subjects, and not very uncommon in virgins; the condition is analogous to the familiar erosion and excoriation produced by prolonged nasal discharges on the upper lips of children. Such an erosion is readily distinguished from that of laceration by the absence of eversion, by the absence of marked cervical enlargement, by the presence of a normally shaped os externum, and by physical examination soon to be described. The treatment is that of the causative endometritis.

The disease most liable to be mistaken for laceration is beginning cancer of the cervix. A careful reading of its description given on page 330 will help to show the difference between the two conditions. Cancer bleeds freely on slight abrasion, is most friable, does not readily permit inrolling with tenacula, and rapidly goes on to ulceration. Laceration presents none of these characteristics.

#### Prophylaxis.

The prophylaxis consists in the avoidance of all measures designed to hasten unduly the progress of normal labor, in the second stage—that is, the avoidance of meddlesome manipulations by digital or instrumental interference. A precipitate second stage should be retarded, if possible, by anæsthesia. The relative disproportion between the child and the cervix may render all precautions useless and the tear inevitable.

#### The Operation of Trachelorrhaphy.<sup>1</sup>

It is not necessarily the extent of laceration, but rather the degree of out-rolling that indicates the necessity for repair. A relatively slight laceration may give rise to extreme eversion and consequently to all of the pathological changes, already described, which belong to the false cervix. Furthermore, slight laceration without eversion may, if associated with great cicatricial formation or cystic degeneration, give rise to very distressing symptoms. On the other hand, a deep laceration may cause little or no disturbance.

**Immediate Operation.** Some obstetricians urge immediate closure of the torn cervix uteri. This operation, if successful, would have the same advantages as immediate perineorrhaphy—that is, less danger of infection through the exposed surfaces, relief from long-continued dread of an operation, and freedom from the evil effects of any pathological changes consequent upon delay. There is, however, great difficulty in recognizing the limit of the fresh tear in the loose folds of the divulsed,

<sup>1</sup> Dr. E. C. Dudley, of Chicago, a former interne at the Woman's Hospital, was the first to designate this operation trachelorrhaphy. Emmet's Principles and Practice of Gynecology.

soft, flabby cervix and the surrounding upper end of the vagina. The exact relations of the torn vaginal wall to the cervix are also difficult to define; for these reasons accurate adjustment of the torn surfaces may be impossible. The immediate operation, therefore, unless necessitated by profuse arterial hemorrhage, is of questionable value; when it is performed, the continuous catgut suture should be used.

**Secondary Operation.** In order to avoid out-rolling, thickening, cystic degeneration, endometritis, metritis, descent, and other pathological changes, early repair of the extensively torn cervix is desirable. The operation is permissible as soon as the cervix has recovered from the immediate effects of extreme divulsion and has regained, so far as the injury will permit, its normal form—that is, at the end of two or three months. Unfortunately, in the majority of cases, the lesion is not recognized or brought to the attention of the gynecologist until the resultant pathological changes have seriously impaired the health of the patient. It is the duty of the accoucheur to make, in the second or third week of the puerperium, an examination of the pelvic organs to determine the existence of any pathological condition which may demand additional attention. This is one of the imperative requirements of modern scientific midwifery.

**Preparatory Treatment of displacements and erosions,** although advised by many, is not imperative. The treatment of the displacement will usually be necessary after the operation, and may properly be deferred to that time. If the associated endometritis be treated by preliminary curettage, closure of the laceration will immediately roll in and finally dispose of the eroded surfaces. If the eroded cervix be greatly thickened or complicated by extensive cystic degeneration, the diseased tissues may be removed at the time of the operation.

It is difficult to discriminate between certain inflammatory conditions in the pelvis which contraindicate and others which indicate the operation. The operation, if performed in a case of acute pelvic inflammation or of suppurative inflammation, acute or chronic, is liable to be followed by general, possibly fatal, pelvic infection, and is therefore contraindicated. The presence in the pelvis of structures which are thickened, hypersensitive, or adherent, in other words, the non-purulent results of a former inflammation, do not necessarily contraindicate Emmet's operation. On the contrary, the improved uterine drainage secured by the preliminary dilatation; the removal of the products of endometritis, and of the original source of the pelvic infection by thorough curettage of the inflamed endometrium, and the rolling in of the irritable everted cervical mucosa, may be the most effective treatment for such pelvic inflammation.

**Puncturing of Cysts.** The follicular retention cysts already described, if present, will, unless properly treated, render the operation for closure of the cervix not only useless, but injurious. If, indeed, these diseased glands are rolled into the cervical canal by trachelorrhaphy, they are liable to enlarge, multiply, and remain there a hidden source of irritation. Often they are so numerous and of such large size as to lead to the suspicion of cancer. If few in number and superficial they may be punctured, or the projecting part of the cyst-wall caught with a tenaculum



and removed by the scissors. The remaining part of the cyst-wall is then destroyed by nitric acid or the galvano-cautery. This may require several treatments before the cervix is ready for operation. Extensive cystic development, especially on the thickened cervix, extending up into the cervical canal, requires excision. Experience has shown that the simple puncturing of the cysts by the spear-pointed lance is inadequate. Unless the secreting surface has been destroyed, the cysts are prone to refill. See Schroeder's Operation.

Instruments for the Operation. The following instruments are required :

- Sims' speculum and depressor.
- Two uterine tenacula.
- Emmet's uterine dressing-forceps.
- Emmet's slightly-curved and full-curved scissors.
- Emmet's needle-forceps.
- Short hæmostatic forceps.
- Needles.
- Four sponge-holders.
- Gauze or sea sponges.
- Catgut and silkworm-gut.
- Rubber sheet or Kelly's pad.
- Hanks' vulsellum-forceps.

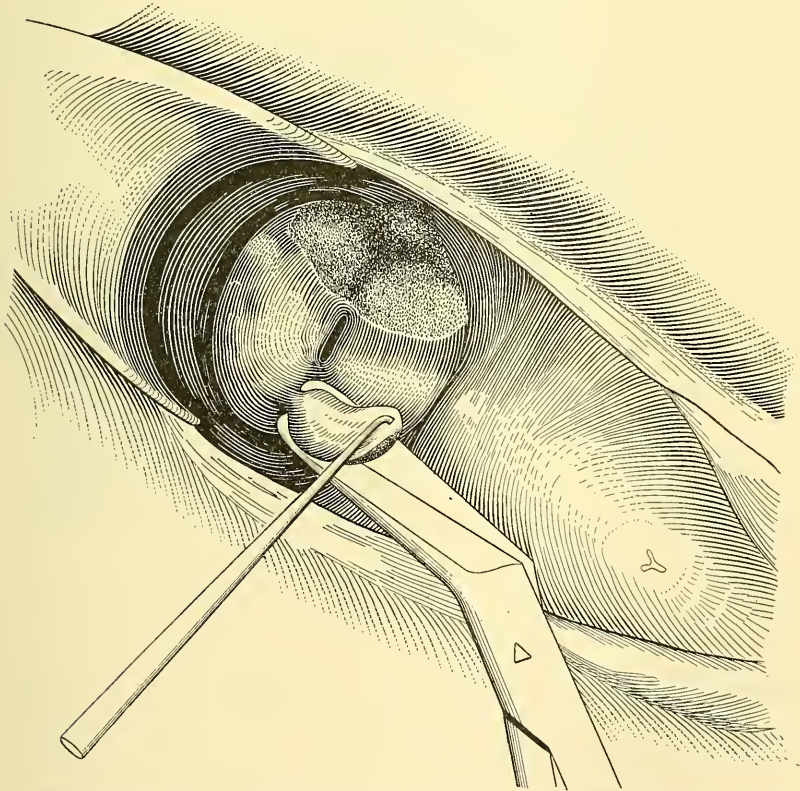
Instruments for dilatation and curettage, as described on page 104.

Many operators prefer the Simon to the Sims speculum; the writer strongly prefers Sims'. Education and habit will, however, fix the choice, which should be limited to these two instruments. The needle with bayonet trocar, or glover's point, is preferable to that with the round point; the latter is difficult to introduce through the indurated tissue without breaking. The full-curved needle is unmanageable; the force required for its introduction is exerted in the line of a tangent to the curve, and is therefore more liable to break the needle than when exerted in the direct line of the straight needle. It may also be difficult to estimate the location of the point of a curved needle. There are practical advantages in a needle slightly curved at the point, but otherwise straight. See Figures 67 and 68.

Disinfection. The general measures to an aseptic result have been detailed in Chapters II. and V. Under anæsthesia the patient is placed on her back; the vagina and external genitals are now thoroughly scrubbed with water and green soap. When the soap has been washed off with hot, sterilized water, the disinfection is completed by an additional washing with a 1 to 2000 solution of bichloride of mercury. A conjoined examination is now made in order to obtain information of any condition which before anæsthesia may have been overlooked. This examination, since it occasionally reveals conditions which may modify or contraindicate the operation, is important. If no contraindication for the operation appears, the patient is placed in Sims' position and the cervix exposed by Sims' speculum. The uterus is now dilated and curetted, washed out, and treated with an intra-uterine application of iodine and carbolic acid as described on page 105. This disinfects the endometrium and decreases the risk of infection.

Preliminary Dilatation and Curettage may be required only for the purpose of exploration, in order to determine the presence or absence of complicating endometritis. If endometritis exists, the object of dilatation and curettage is to prevent infection of the wound and failure of union from contact of the pathological secretions of the diseased endometrium, to secure efficient drainage of the endometrium, and thereby to prevent the retention, stagnation, decomposition, and absorption of its secretions, and to avoid leaving an infected endometrium, which, after closure of the cervix, might by extension involve the parametria, uterine appendages, and peritoneum in disabling or dangerous inflammation. For these reasons, therefore, preliminary dilatation and curettage are demanded.

FIGURE 303.



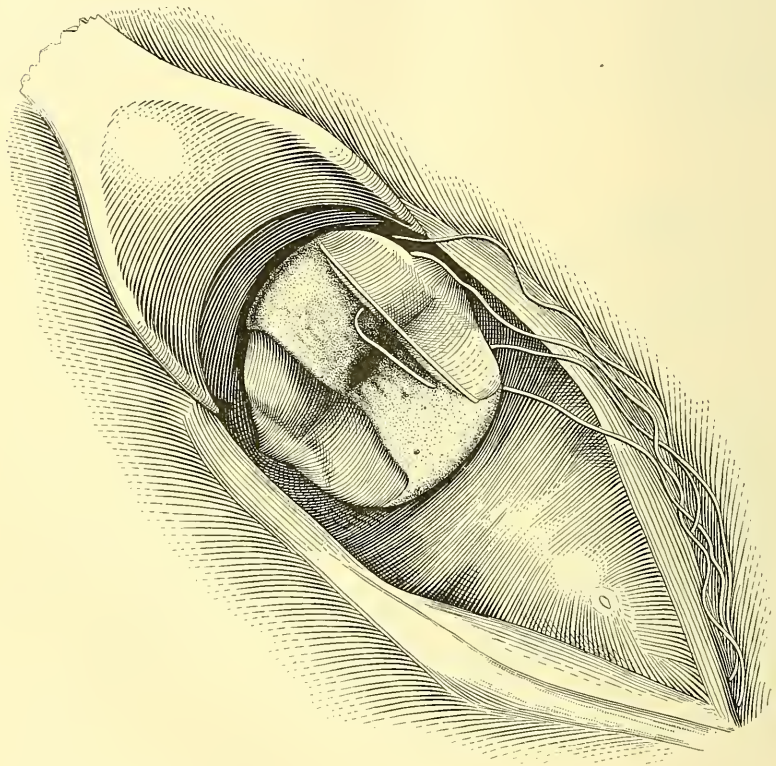
Manner of denudation with uterine tenaculum and Emmet's curved scissors. One side denuded, the other partly denuded. Left latero-prone position; exposure by Sims' speculum.

**Approximation.** Before proceeding to the closing of the cervix a careful study is made of the direction or directions and extent of the injury, by trial approximations of the torn fragments in various ways

by means of a tenaculum in each hand. If it be a simple bilateral laceration, the operation is as follows:

**Denudation.** With the tenaculum and curved scissors the surfaces to be united are denuded. Figure 303 shows the manner of denudation. Inasmuch as one of the important functions of the uterus is

FIGURE 304.



Shows the surface denuded and two sutures in place, but not tied. Left latero-prone position; exposure by Sims' speculum.

drainage, it is essential to leave a wide and free outlet at the external os. To this end that portion of the undenuded mucosa which is to line the restored external os is left wide, so that when united the normal trumpet-shape of the lower portion of the cervical canal will be preserved. Sufficient allowance must also be made in the denudation for the involution which will take place after the operation. This is essential, for immediately after the operation the diameter of the restored external os should be larger than normal, so that the involution which follows the operation will ultimately reduce it to the normal calibre. Figure 306 shows the properly curved lines between the denuded and undenuded surfaces. Stenosis at the external os so



extreme as to exclude the finest probe, and sometimes amounting to complete atresia, is a possible result of inattention to this important detail.

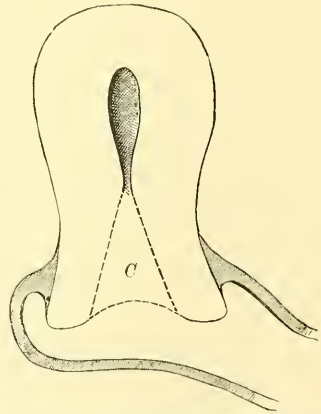
The evil consequences of stenosis and obstruction to the uterine secretions and menstrual fluid will be apparent from the following: 1. Recurrent distention of the uterus from accumulation of the secretions, which may even distend the Fallopian tubes, is almost certain to occur. 2. Endometritis, metritis, and infection of the uterine appendages may give rise to immediate disastrous results or may remain a source of chronic irritation and bring about a state of persistent invalidism. 3. The rapid and complete relief which often follows the reopening of a contracted cervical canal and os externum proves that the integrity of the uterine canal as a natural drainage-tube is essential to health.

Removal of the Cicatricial Plug. The denudation should always include the removal of the plug of cicatricial tissue from the angle of the laceration. This important step in the operation, if disregarded, may prevent the easy approximation of the denuded surfaces, cause the sutures to cut out from undue tension, and may result in a failure of union or imperfect union. Failure of union, however, under such conditions would be a fortunate compromise for the patient, since the cicatrix is much less injurious with the laceration open than closed. When, unfortunately, union has taken place, the consequent train of nervous symptoms may necessitate the re-opening of the wound and the removal of the cicatricial plug.

Hemorrhage. The usual slight bleeding is readily controlled by sponge pressure. Arterial hemorrhage, if not controlled by forcipressure or torsion, may require a fine catgut ligature. In some cases the bleeding must be checked by the application of one or two deep sutures.

The Sutures may be of silver wire, catgut, or silkworm-gut. Silver wire is discarded because it is unwieldy and asepsis has rendered it unnecessary. Silkworm-gut remains aseptic longer, and is therefore superior to catgut. If the perineum is closed at the same time, the difficulty of the removal of the sutures may justify the use of absorbable catgut, which does not have to be removed. Catgut may also be used in the repair of all small lacerations, especially where the surfaces readily fall together and remain in apposition without traction. As ordinarily prepared, it is absorbed too soon. Formaldehyde or chromicized catgut resists absorption long enough to insure solid union. In order that the sutures may not convey possible infection to the wound,

FIGURE 305.

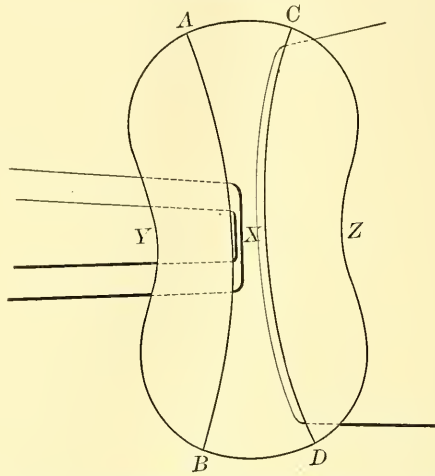


C. Exaggerated view of the cicatricial plug. The dotted lines show lines of incision for its removal. Very few cases would require such extensive excision.<sup>1</sup>

<sup>1</sup> After Emmet. Principles and Practice of Gynecology.

they should in all plastic surgery, so far as possible, be passed under and not through the denuded surfaces. This principle is illustrated

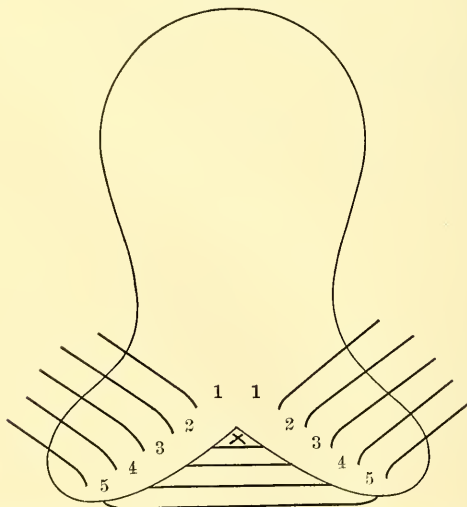
FIGURE 306.



A line connecting Y, X, and Z would represent angle of laceration; X, section of uterine canal at angle of laceration. Three of the sutures in place. Diagrammatic.

by the dotted lines in Figure 306; the surface between the lines A B and C D is left undenuded to form that part of the cervical canal which

FIGURE 307.



Sutures in place on one side ready to tie. Diagrammatic.

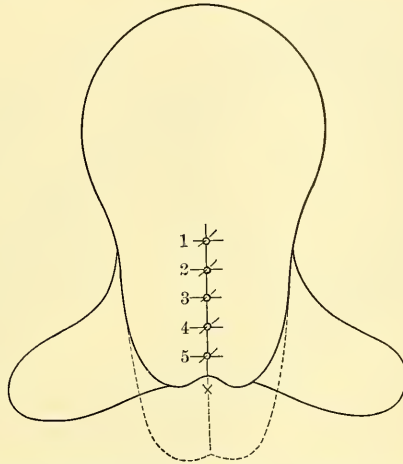
is to be restored. Two sutures, as indicated, have been passed on one side, and one on the opposite side. When all the sutures have been

tied they will bring the surface  $A Y X Z C$  in contact with the surface  $B Y X Z D$  in such a manner that point  $A$  will coincide with point  $B$ , and point  $C$  with point  $D$ . The lines  $A C$  and  $B D$  will then bound the restored external os.

Figure 307 shows the same laceration from another point of view. The sutures on one side are represented as all having been introduced before any are tied. This was the plan formerly pursued when the silver suture was used. It is better to tie the silkworm-gut or catgut sutures as they are introduced.

Figure 308 shows the sutures tied, the everted mucosa rolled in, and the operation complete.

FIGURE 308.



Showing the rolling-in effect of the operation. Sutures tied. Diagrammatic.

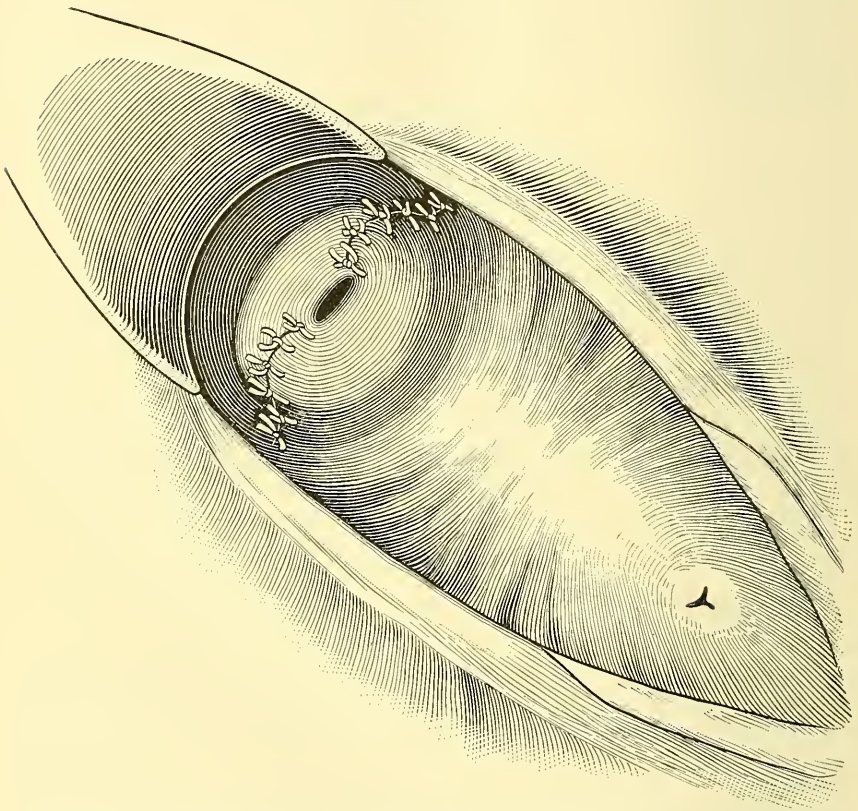
A study of Figures 307 and 308 will disclose an interesting fact in the mechanics of laceration and trachelorrhaphy. If in the subinvolute uterus represented by Figure 307 the distance from the angle of laceration,  $\times$ , to the fundus is, say, three inches, and the distance from the angle of laceration to the margin of the torn lip is one inch, it would appear reasonable to assume that the uterine canal, when fully restored, would measure four inches. Accurate measurements of the uterine canal, however, before and after operation almost always show a decrease, not an increase, in its length. In a uterus of such dimensions, the canal, after operation, would usually measure not four, but about two and three-quarters inches. The explanation of this decrease is as follows :

As shown in the pathology, the intra-uterine mucosa rolls out, and the lowest portion of the uterine canal becomes the external os of the lacerated cervix, point  $\times$ , Figure 307. In tying the first suture points 1 and 1 are not only brought together to form one and the same point, but all mucosa above this suture is at the same time rolled into the uterine canal so that point  $\times$  moves up and point 1 takes its place. On successively tying the other sutures, 2, 3, 4, and 5, the same mechanical result is observed, so that finally suture 5, when tied,



occupies the place formerly occupied by  $\times$ . All the mucosa between 1 and 5 on one side, and 1 and 5 on the other, is now rolled into the uterine canal above the original level of point  $\times$ . This mechanical result alone abundantly justifies the operation; it also verifies the propositions laid down in the preceding paragraphs on the mechanical results of the lesion.

FIGURE 309.



Left latero-prone position; exposure by Sims' speculum. The sutures tied and the cervix united, as seen looking through the speculum into the vagina. Notice the lines of union running from the os over the cervix across the utero-vaginal attachment into the reflected vaginal wall. In this case, as in all others, a great part of the tear is in the vaginal walls.

The reasons for so great a decrease in the length of the uterine canal may not be wholly apparent from the foregoing. The following reasons, in addition to the rolling in of the everted tissue, are therefore submitted: Loss of blood and tissue in denuding; evacuation or removal of retention cysts; contraction of muscular fibre due to the stimulus of the operation, and, above all, relief from congestion, which naturally follows restoration of everted intra-uterine structures to their normal position inside of the uterus. The out-rolled structures were, so to speak, in a state of erection.

**Operation for Atypical Lacerations.** The closure of a unilateral, anterior or posterior laceration follows the rules already laid down for simple bilateral injuries. Stellate lacerations may in some cases be treated by closure of each individual tear, or if two are very near together, they may be reduced to one by the removal of the intervening tissue. There may be one or two major and several minor rents; in such a case the surgeon may sometimes disregard the small fissures, and by rolling in the everted cervix, as indicated by the deeper tears, find that the smaller ones disappear within the canal, and in the operation may, therefore, be ignored. It is impossible to anticipate every variation in the direction and effect of the injury. Each atypical case must be treated according to its special requirements.

**Resection of the Cervix.** In a large proportion of cases of laceration of the cervix the lesion is unrecognized or neglected, or otherwise unskilfully treated, so that great pathological changes have occurred. These changes may either prevent or contraindicate the rolling in of the diseased tissues, or, if the cervix has been improperly closed, may require it to be reopened; they are:

1. Great thickening and induration of the lacerated lips, which, if possible to roll into the uterine canal at all, would cause traction upon the sutures, and result in their cutting out; or, if union should occur, the induration and thickening might persist and give increased trouble.

2. Extensive cystic degeneration of the Nabothian follicles. The evil results of rolling these cysts into the cervical canal have already been mentioned.

3. Endocervicitis, with deep involvement of the cervical glands, and a consequent profuse discharge of a ropy, tenacious, gelatinous secretion. The only satisfactory treatment of this condition is excision of the diseased structures. Their destruction by the actual cantery or sharp curette is apt to be followed by contraction and stenosis of the cervix.

4. Stenosis in the lower portion of the cervical canal and os externum. This condition may be due to too tight closure of the cervix or to cicatricial contraction from curettage, cauterization, or other causes.

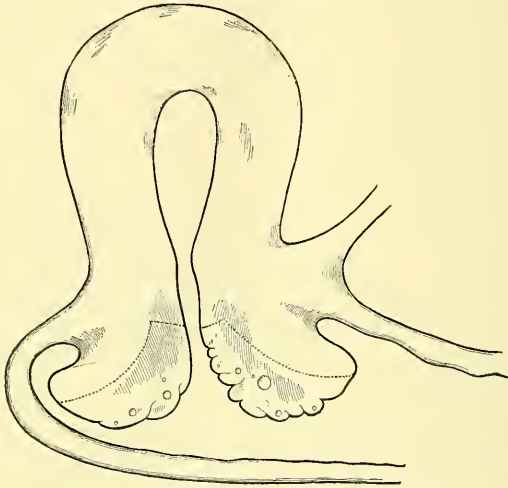
Under the conditions above named the diseased tissue must be removed by resection of the cervix—Schroeder's operation.<sup>1</sup> The technique of the operation is as follows: The diseased tissue is removed by incisions as indicated in Figure 310; the vaginal margins of the wound are then stitched, both anteriorly and posteriorly, with fine chromicized or formaldehyde catgut, to the margins of the intracervical mucous membrane. By this means the anterior and posterior lips of the cervix are folded upon themselves. The first stage of the operation is now complete, and the condition becomes that of an uncomplicated bilateral laceration. The remainder of the operation is the same as that of trachelorrhaphy, already described.

Before proceeding to the excision of the diseased structures it is often necessary to supplement Schroeder's operation by deep lateral incisions with the scissors. By this means the anterior and posterior lips may

<sup>1</sup> Emmet had for many years before the publication of Schroeder's operation performed an operation in principle like Schroeder's, but differing in technique.

be widely separated far up into the uterine canal, and the diseased structures thoroughly inspected and efficiently removed. This tissue is

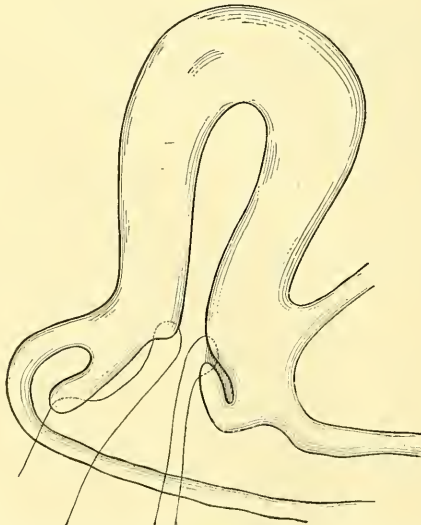
FIGURE 310.



Shows a thickened diseased cervix requiring resection. The dotted lines indicate the directions of incision.

best removed by seizing it in small vulsellum forceps and cutting it out with two or three strokes of the scissors. The frequent closure of

FIGURE 311



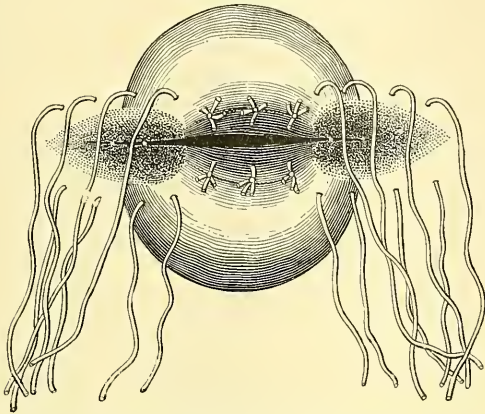
Shows the diseased tissues excised and sutures in place, but not yet tied, to unite the vaginal margin to the cervical margin of the wound.



the lacerated cervix without the removal of these diseased structures accounts for numerous failures and disappointments in the operation.

The brief report of a single case<sup>1</sup> will serve to illustrate the importance of resection. Trachelorrhaphy had been performed ten years

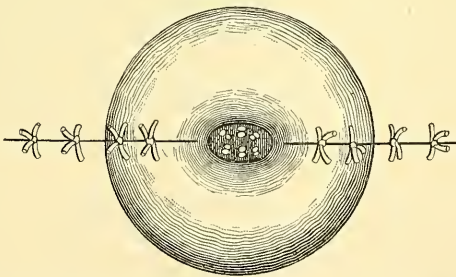
FIGURE 312.



Anterior and posterior vaginal margins each turned into cervical canal and united by means of fine catgut sutures to the intracervical margins of the wound. Lateral surfaces denuded and sutures placed, as in ordinary trachelorrhaphy, but not yet tied.

before. From the time of that operation the patient had suffered from pronounced catalepsy, with frequent paroxysms. Examination showed an enormously thickened cervix with a pinhole os. Both ovaries were slightly enlarged and adherent. In order to ascertain the condi-

FIGURE 313.



All sutures tied ; operation complete. The white dots in the os represent the protruding intracervical sutures.

tion of the interior of the cervix, very deep bilateral incisions were made: the anterior and posterior lips were separated more widely than would be usual in an extensive laceration of the cervix. Much pent-up secretion which escaped showed that the tight closure of the os externum had converted the whole endometrium into a retention cyst.

<sup>1</sup> Dudley : The Abuse of Emmet's Operation for Laceration of the Cervix. Journal of the American Medical Association, September 23, 1893.

Numerous cysts of the Nabothian follicles, superficial, deep, large and small, appeared in the intracervical mucosa and submucosa. In the excision of these cysts the cervical mucosa and submucosa were removed almost to the internal os; the vaginal and intracervical margins of the wound were united with catgut sutures, as shown in Figure 311. What remained of the lateral incisions was then closed with interrupted slikworm-gut sutures. The operation, except the very deep lateral incisions, was practically that of Schroeder. Since recovery from the operation the patient, though naturally neurotic, has reported herself free from cataleptiform seizures.

The After-treatment consists of rest in bed for about ten days, a vaginal douche of hot sterilized water twice daily, and the removal of the sutures through Sims' or Simon's speculum in about two weeks. If the perineum and cervix are closed at the same time, the pressure of the speculum in the removal of the cervical sutures, if carefully used, does not imperil the freshly-united perineum, provided the perineal sutures are still in place; if they have been removed, it is necessary to delay the removal of the cervical sutures until the perineal union is solid—that is, for an additional two weeks. It is better, however, in the double operation, as already stated, to use in the cervix the absorbable catgut sutures, which do not have to be removed at all.

Results. Trachelorrhaphy, properly performed in suitable cases and with due regard to asepsis, is one of the most satisfactory operations in gynecology. Union by first intention is the almost invariable rule. The relief from symptoms is often very great.

Disappointment in the results of the operation may result from neglect to treat the complicating endometritis; from the rolling in of hopelessly diseased structures, which ought to have been excised; from disregarding the contraindications of pelvic suppuration; from closing the os externum so tightly as to obstruct the natural outflow of uterine secretions; from want of proper preparatory treatment; from the unwise selection of cases, and, above all, from faulty technique in the operation itself.

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## CHAPTER XLIII.

### GENITAL FISTULÆ.

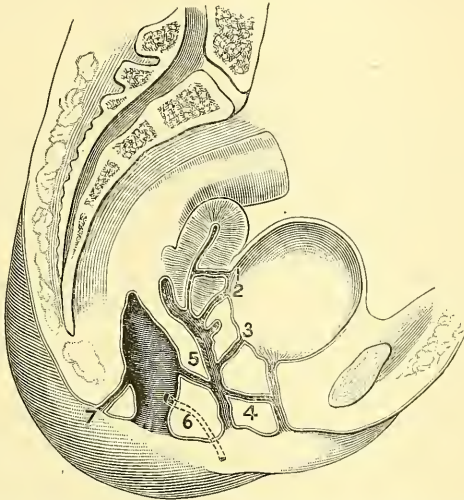
A FISTULOUS opening may connect the interior of the uterus or vagina with some part of the urinary or intestinal tract. Accordingly, the varieties of genital fistulæ are urinary fistulæ and fecal fistulæ.

Figure 314 shows the more common varieties of genital fistulæ. They are:

- |                               |                          |
|-------------------------------|--------------------------|
| Vesico-vaginal fistula.       | Urethro-vaginal fistula. |
| Vesico-uterine fistula.       | Recto-vaginal fistula.   |
| Vesico-utero-vaginal fistula. |                          |

Other forms rarely occur, as follows : The ureter may communicate directly with the vagina, making a *uretero-vaginal fistula*. The ureter may open into the margin of a vesico-vaginal fistula, making a *uretero-vesico-vaginal fistula*. Various other rare forms, such as *uretero-uterine fistula*, must be classed as surgical curiosities.

FIGURE 314.



1. Vesico-uterine fistula. 2. Vesico-utero-vaginal fistula. 3. Vesico-vaginal fistula. 4. Urethro-vaginal fistula. 5. Recto-vaginal fistula. 6. Perineo-anal fistula. 7. Anal fistula.

The causes of genital fistulæ are these :

Impaction of the presenting part during labor and consequent pressure necrosis.

Direct traumatism.

Congenital causes—that is, defective development.

Ulcerative and other destructive processes from syphilis, cancer, and inflammation. Burrowing of pus from an abscess.

### VESICO-VAGINAL FISTULA.

The definition of the lesion is apparent from the name—that is, a fistulous opening between the bladder and vagina.

#### Etiology.

In the vast majority of cases the lesion results from impaction of the presenting part during labor and consequent pressure necrosis in the vesico-vaginal wall. Completion of the necrotic process and separation of the slough require from five to twelve days; hence, in fistula from this cause, the essential symptom, escape of urine through the vagina, does not occur until several days after labor.



A fistulous opening is sometimes purposely made by a surgical operation for the treatment of cystitis or for the removal of stone in the bladder, or it may be the result of accidental traumatism. The escape of urine will then be immediate. Congenital fistula is rare, and is characterized by the escape of urine from the time of birth. The ulcerative processes of syphilis, cancer, and inflammation are much more frequently the cause of fecal than of urinary fistula.

### Symptoms and Course.

The essential symptom, already mentioned, is the escape of urine from the bladder through the vagina. The fistula may vary from the size of a pinpoint to that of the entire vesico-vaginal wall. When the opening is of appreciable size or large, the flow of urine is usually constant. In very small fistulæ the escape of urine may be intermittent. The intermission is apt to be when the woman is lying down. In rare cases of small fistula a valve-like formation may shut off the flow of urine, except when the woman assumes certain positions favorable to its escape.

**A Cause of Cystitis.** In the majority of cases there is more or less residual urine in the bladder. This is a good culture-medium for the bacteria which now find ready access from the vagina; hence cystitis is a usual complication. From this cause the urine becomes alkaline, ammoniacal, and excessively irritating. The vagina, external genitals, thighs, and buttocks, over which it flows, become excoriated, œdematous, and ulcerated. A gritty, offensive phosphatic deposit may form and deeply incrust not only these surfaces, but also the raw margins of the fistula and the bladder mucous membrane. This deposit is specially apt to accumulate and form incrustations on ulcerated and otherwise exposed surfaces. It may fill the vagina and even extend over the ulcerated labia. The inside of the bladder, perchance deeply ulcerated, granulating, incrustated, bleeding, and excessively painful, may, if the fistula be large, become inverted and protrude in a semi-strangulated condition between the labia majora.<sup>1</sup> The patient, within a few weeks after labor, may, without great care, become an object of loathing and pity.

### Diagnosis and Prognosis.

The opening, if sufficiently large, may be felt by the finger in the vagina. Having thus located the fistula, the finger may be used as a guide for the passage of a sound through the urethra into the bladder, and thence through the fistulous opening into the vagina.

When the fistula is very small it is sometimes difficult or impossible to see it, even after careful search through the speculum. In such a case, the speculum being in place, the bladder should be injected through the urethra with sterilized water or colored water. The point at which this fluid escapes into the vagina will locate the fistula.

<sup>1</sup> Emmet : Principles and Practice of Gynecology.

## Prognosis.

The prognosis depends upon the extent of the injury, the amount of cicatricial tissue, and the difficulty of approximating the margins of the fistula. In exceptional cases of small opening, in which the margins lie in easy and close apposition, they may, if kept clean, unite without operative interference. The vast majority of fistulæ, however, unless united by suture, are permanent.

## Prophylactic Treatment.

The statistics of Emmet, in a long series of cases of vesico-vaginal fistula,<sup>1</sup> show that the average duration of labor from the time of rupture of the membranes to the birth of the child was between two and three days. Statistics further prove that impaction and consequent continued pressure of the presenting part upon the vesico-vaginal septum, even for a few hours, is very liable to result in cutting off the circulation and, in consequence, death and sloughing of the compressed tissue. If, therefore, in any case impaction becomes apparent by the failure of the presenting part to advance during the pains and to recede in the interval between the pains, delivery should be hastened and terminated without unnecessary delay. The possible danger of a forceps operation in such a case, even by the inexperienced hand, when compared with danger of fistula, would be insignificant.

Emmet's records show that in nearly all of his cases parturition had taken place either without attendance or under the care of ignorant midwives. In some cases labor had finally terminated by the unaided efforts of nature, and in others by the use of the forceps. In the latter class of cases delivery is usually accomplished by a consultant, who is not called until after prolonged continuous pressure has destroyed the vitality of at least a part of the vaginal wall. Sometimes the fistula is wrongly attributed to the forceps or other instruments, instead of the real cause—prolonged pressure—a cause which earlier interference would have prevented. As Dr. Thomas wisely remarks, the truth on this point should be clearly set forth, "for unless it be so, an incompetent person may shield himself from merited blame by casting censure upon a consulting physician, by whose efforts the lives of both mother and child may have been saved, or a skilful operator may suffer unjustly in a suit for malpractice."<sup>2</sup>

Emmet's statistics show that in a large proportion of cases the bladder was not emptied during the progress of labor. This neglect would cause large accumulations of retained urine and great distention of the bladder. The result would be paralysis of the bladder and cystitis. Moreover, the impaction would be strengthened by the pressure exerted on the bladder side of the vesico-vaginal septum. This pressure also would be an additional cause of necrosis. Catheterization, therefore, as a prophylactic measure is an urgent necessity.

<sup>1</sup> Principles and Practice of Gynecology.

<sup>2</sup> Thomas: Diseases of Women.

After delivery in a case of continuous and prolonged impaction, decided antiseptic measures are indicated to prevent or limit the threatened necrosis. They are :

1. A vaginal douche of  $\frac{1}{2}$  per cent. lysol, or some other appropriate antiseptic, every eight hours.
2. Daily washing out of the bladder with a saturated solution of boric acid.
3. Sufficiently frequent catheterization to prevent great accumulations of urine and consequent bladder distention.

### Surgical Treatment.

This includes the preparatory treatment, the operation, and the after-treatment.

**Preparatory Treatment.** If the parts are brought into a condition most favorable for union the operation for the cure of vesico-vaginal fistula, even with ordinary skill, is one of the most satisfactory in the whole field of surgery. On the other hand, the most skilful operation, with faulty preparation, is almost certain to fail.

The margins of the fistula cannot be brought into a healthy condition and made fit for union until the phosphatic deposit, already mentioned, has been removed and its further formation prevented. In order to prevent its formation, the urine should be rendered acid; otherwise the deposit will accumulate on the sutures and in the lines of union, and make the operation fail. It does not, however, develop in acid urine. Emmet's mixture of benzoic acid, two drachms; borax, three drachms; and cinnamon water, twelve ounces, gives uniformly good results. A tablespoonful, further diluted, should be taken four times a day until the urine becomes mildly acid. The dose should then be so regulated as to maintain normal acidity and to avoid deranging the digestion. In order to dilute the urine and render it less irritating, pure water, preferably rain-water or distilled water, should be given quite freely. If the urine is kept only slightly acid and diluted, the phosphatic deposits once removed will not return.

The removal of the deposit is best accomplished by means of a dressing forceps, or it may be brushed off with a wad of cotton in the grasp of the forceps. Then apply to the raw surfaces, by means of an applicator wound with cotton, a solution of nitrate of silver, ten grains or more to the ounce. Sometimes the deposit adheres most firmly, as if it were interlaced with the adjacent tissue. Its immediate removal may then be too difficult or painful. Emmet then applies a stronger solution or even the solid stick of nitrate of silver to the deposit itself. This may be repeated every few days until the deposit is detached.

The hot vaginal douche described on page 80, although no longer considered a gynecological panacea, is of the utmost value in the preparatory treatment. It should be freely given several times a day, and large quantities of hot water should be used. This part of the treatment, as Emmet declares, is indispensable. The sitz-bath also is most useful and grateful to the patient. The douche may be given to advantage while the patient is in the sitz-bath. This treatment, of



cleanliness alone, in some cases, even of large fistula, has resulted in complete closure. They were cases, however, in which there had not been great loss of tissue and in which the raw edges of the fistula were in easy apposition.

The excoriated or eroded surfaces about the nates or thighs are best treated by frequent bathing, followed by applications of benzoated oxide of zinc ointment. Napkins like menstrual napkins should be worn over the vulva to absorb the urine, and should be frequently changed. Otherwise the urine which they hold will decompose and become excessively irritating to the skin. Points of ulceration may be touched with the solid nitrate of silver.

*Cystitis*, if present, is a clear contra-indication to the immediate closure of the fistula. The copious hot water vesico-vaginal douche, frequent and prolonged, is the best means of treating this complication. It is given as an ordinary vaginal douche, except that the hot water, instead of being thrown in by the douche point through the vulva, is introduced through the urethra. For this purpose a glass urethral catheter or a canula small enough to enter the urethra is used in place of the vaginal douche point. The hot water is by this means first freely applied to the bladder, and then through the fistula to the vagina and vulva. Cystitis, in these cases, as already explained, is caused by the presence of residual urine. It may therefore be necessary, especially in a very small fistula, to secure adequate drainage of the bladder by an incision in the vesico-vaginal wall. If the fistula is situated in or near the median line of the vesico-vaginal septum, the incision should be so made as to enlarge it, otherwise an independent opening should be made. See Treatment of Cystitis by Means of Artificial Vesico-vaginal Fistula, page 281. Old inflammation of the kidney or ureter may be present, and if in an advanced stage might contra-indicate the operation; hence the importance of the rule to examine the urine in every case. The urine may be collected for examination by keeping the woman on a bedpan until a sufficient quantity has accumulated.

*Stone in the Bladder*, free or encysted, may in rare cases have antedated and even been a cause of fistula—that is, the vesico-vaginal septum during labor may have been compressed between the stone and child's head. Usually, however, the calculus is deposited from the residual urine already mentioned as a frequent result of fistula. The necessity for the removal of such a stone before closing the fistula is apparent.

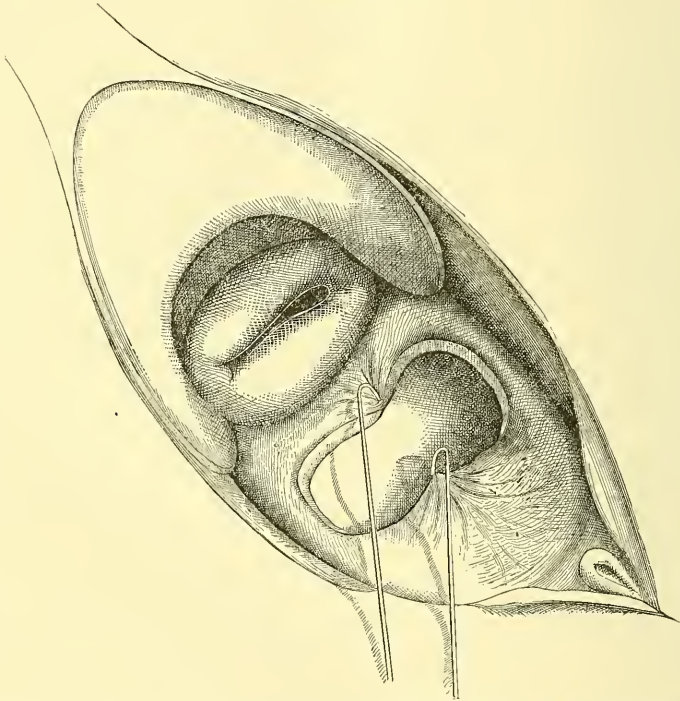
*Direction and Manner of Closure.* The urine being normal, the vagina and bladder being healthy, and the structures surrounding the fistula being fit for union, the next step will be to decide upon the best direction and manner of closure. It is desirable, if possible, to bring the parts together from side to side so as to make a line of union as nearly as possible in the line of the long axis of the vagina. This preserves the length of the vagina. A line of union transversely across the vagina would shorten its anterior wall, and would draw down the uterus and fix it in permanent displacement.

Unfortunately, in many cases of extensive sloughing, the margins of the fistula cannot be approximated from side to side. They may even

be so held apart by cicatricial bands that they cannot be approximated at all, or there may not be tissue enough left to fill the gap. In order to decide upon the best mode and direction of closure, the fistula should be exposed by Sims' speculum, and its margins at different points seized on opposite sides and drawn together with a tenaculum in each hand. In this way one may judge of the amount of force required to approximate the edges and of the direction in which they will come together with the least traction.

*It is an urgent rule never to introduce sutures unless the surfaces to be united can be held in contact without traction; even a little traction on the sutures will cause them invariably to cut out and the operation to fail.*

FIGURE 315.



Vesico-vaginal fistula exposed by Sims' speculum. Approximation of the margins attempted by means of tenacula. Left latero-prone position; exposure by Sims' speculum.<sup>1</sup>

If the restraining bands are so light and superficial that moderate traction with tenacula suffices to approximate the margins of the fistula, they may be divided by scissors until the margins readily fall together. The surfaces may then be immediately denuded and the sutures introduced.

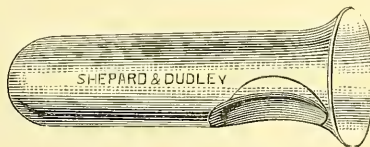
If the sloughing has been very extensive one or more preliminary operations may be necessary. Emmet places the patient on her back, introduces two fingers of the left hand into the rectum, and the thumb

<sup>1</sup> Emmet: Principles and Practice of Gynecology.

of the same hand into the vagina. The interior of the vagina is thereby rolled out and exposed without a speculum. The right index-finger in the vagina now detects the points of greatest cicatricial tension. Point after point is snipped with the blunt scissors in such a way as to render the margins of the fistula more readily approximated. If the cervix uteri has sloughed the relations of the remaining portion of the uterus to the upper part of the vagina, even by rectal touch, may be difficult to make out. There is then great danger of wounding a misplaced ureter or of entering the peritoneum. This danger is lessened by the careful use of the sound in the bladder. It may be held by the hand of an assistant.

The vagina having been opened as freely as may at the time be deemed prudent, Emmet<sup>1</sup> directs that a Sims' glass or hard vaginal plug be introduced and held in place by a T-bandage. It should be sufficiently long and wide to keep the vagina well stretched both longitudinally and laterally, and to control hemorrhage by pressure, but not so large as to cause pressure necrosis and sloughing. Under this pressure, absorption of cicatricial tissue is rapid. The continued stretching of the vagina also increases its calibre and renders the ap-

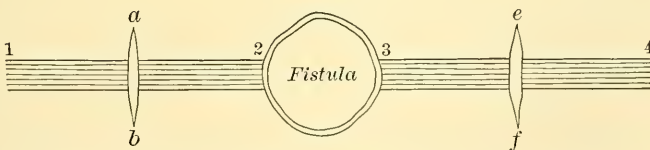
FIGURE 316.



Sims' glass vaginal plug.

proximation of the margins of the fistula less difficult. The dilator may have to be worn for several weeks until the incisions have healed over it; in the mean time it may be removed daily for cleansing douches. The patient should be kept in bed for a week or two after the operation, and the urine should, if necessary, be drawn with a catheter. After healing has taken place, the operation may be repeated, or if the margins of the fistula can be brought together without tension the sutures for closure may be introduced.

FIGURE 317.



1, 2, and 3, 4, represent the restraining cicatricial bands on each side of the fistula; *a, b,* and *e, f,* show the lines of the incision.

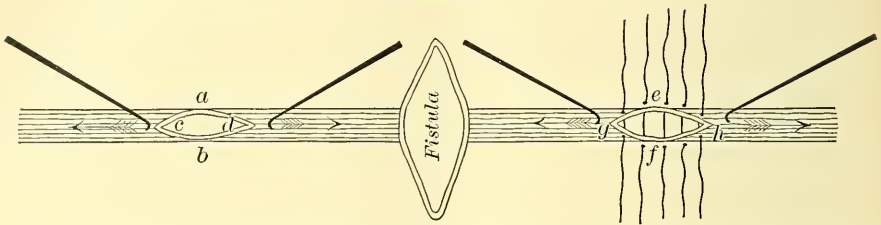
In place of the incisions and glass dilator just described, the restraining cicatricial bands may be deeply and freely divided and the wounds

<sup>1</sup> Principles and Practice of Gynecology.



closed at right angles to the lines of incision. The operation is illustrated in Figures 317, 318, and 319.

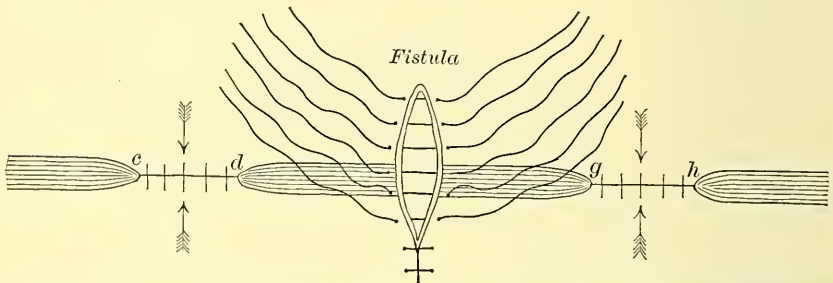
FIGURE 318.



The wounds made by incisions *a*, *b*, and *e*, *f*, are drawn widely apart by tenacula so as to give the wound on either side of the direction of *c*, *d*, and *g*, *h*. Sutures are in place on right side.

The preliminary plastic work may, according to indication, be done at the time of closing the fistula or as a separate operation.

FIGURE 319.



Incised wounds on both sides of fistula closed at right angles to lines of incision. The edges of the fistula now readily fall into apposition. Sutures for closure of fistula in place, and two of them tied.

The preparatory treatment above outlined may be difficult, long continued, and most trying both to patient and surgeon. Fortunately, there are many cases in which it is not required. When it is required the most skilful operation will fail without it.

The Operation for Closing the Fistula. This involves a consideration of the following topics :

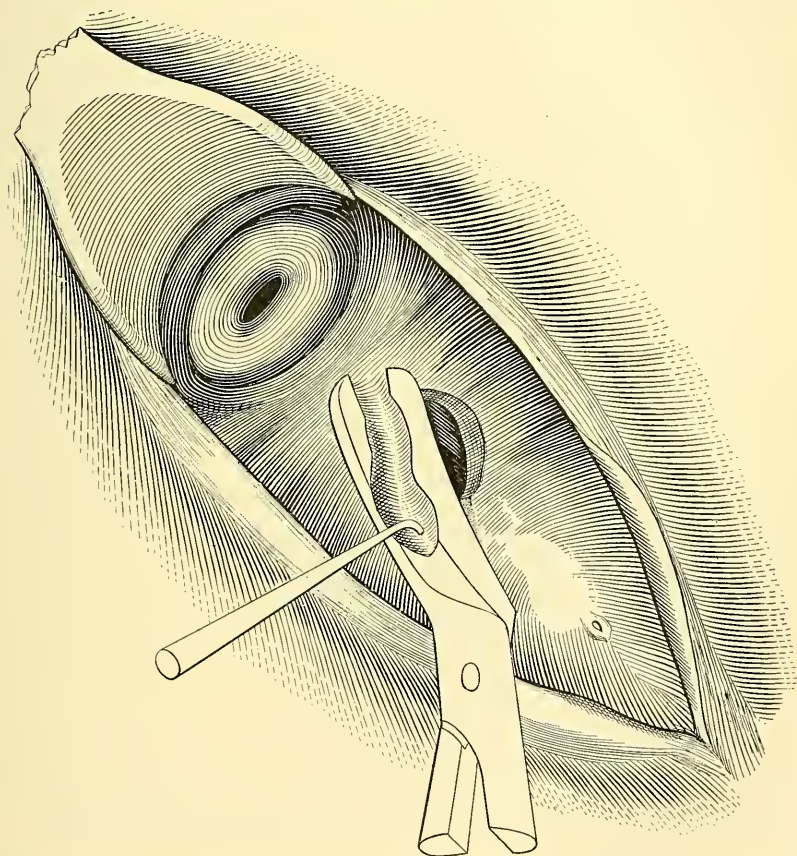
1. General preparatory treatment.
2. Choice of speculum and method of operation.
3. Choice of direction for closure of the fistula.
4. Denudation.
5. Introduction of sutures.
6. After-treatment.

1. *The general preparatory treatment and arrangements for plastic operations described in Chapter II. are applicable and adequate for this operation.*

2. *Choice of Speculum and Method of Operation.* The author's choice between the method of Simon, with the patient in the dorsal position, the parts being exposed by numerous vaginal retractors, and

that of Sims, with the left latero-prone position and Sims' speculum, is based upon an extensive experience with both methods. The Simon method is serviceable and adequate for the ordinary case, but not always in difficult cases. This is especially true when the fistula is near the vaginal outlet behind the ramus of the pubes. In fat subjects, moreover, the Sims' position and speculum are almost indispensable. Decided preference is, therefore, given to the method of the late Marion Sims as taught and practised by Emmet. The position of the patient and the use of the speculum are described in Chapter III.

FIGURE 320.



The use of the uterine tenaculum and Emmet's scissors in denudation. Left latero-prone position ; exposure by Sims' speculum.

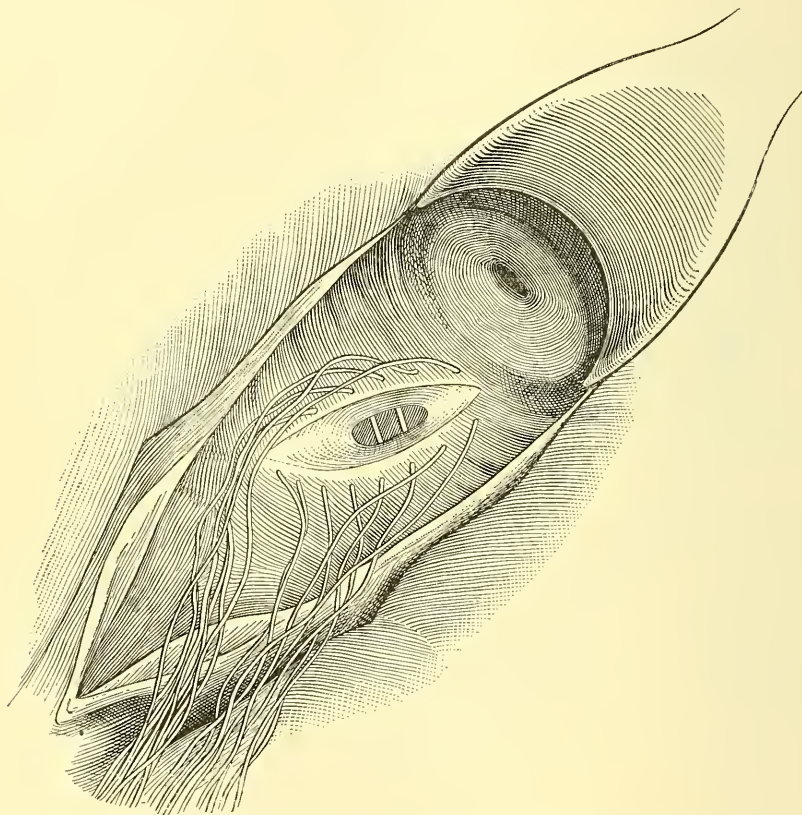
3. *Direction of the Line of Union.* In order to decide upon the exact direction for closure, the edges of the fistula are approximated in different ways with tenacula, until that direction is found and adopted which permits the margins of the fistula to be approximated with the least traction. For reasons already given, it is always desirable to

make the line of union, if possible, in the direction of the long axis of the vagina.

4. *Denudation.* The edges of the fistula are denuded by means of the tenaculum and scissors, as shown in Figure 320.

The skilful hand will denude superficially or deeply, as may be required. The denuded surfaces must be made clean and smooth; the bleeding should be slight. In all of these respects the uterine tenaculum and scissors are far superior to the tissue forceps and the scalpel.

FIGURE 321.



The proper area of denudation. The denuded surfaces correspond to the deck and the fistula to the manhole of a canoe. Left latero-prone position; exposure by Sims' speculum.

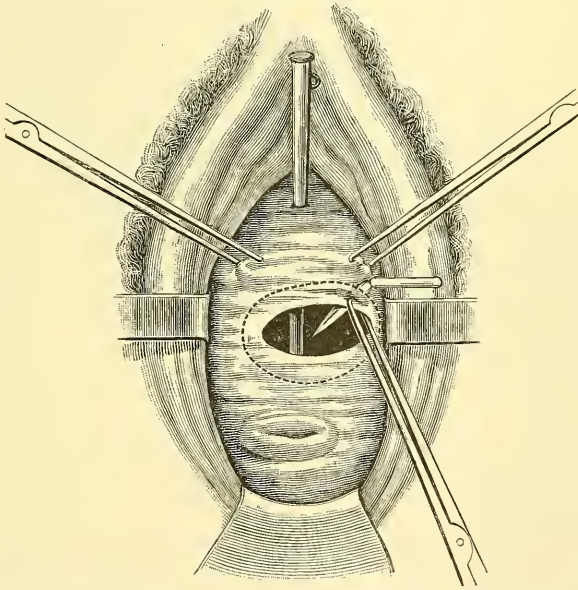
The margins of the fistula are seized with the tenaculum, at the point nearest the operator, and a strip is cut away all around the opening. It is highly important that broad surfaces be secured for approximation; hence it may be necessary to remove one or more additional strips around the opening. If the sloughing has left the edges about the fistula quite thin, the denuded surfaces should be broader. The two points upon which the greatest stress is laid are, first, adequate preparatory treatment; second, broad surfaces for union.



The fistula may be so small as to be inaccessible for denudation, and may therefore have to be enlarged by incision in order that its margins may be freshened and united.

Instead of denuding, some operators split the edges of the fistula. This method, though not usual, is yet most advantageous when the margins are thin or it is specially desirable to economize tissue. See Figures 324 and 325. The bladder mucosa, if cut, is prone to bleed freely; hence the denudation should ordinarily extend to but not into it. Hemorrhage from the cut bladder mucosa has, even in the careful hands of Emmet, twice been so free as to distend the bladder and endanger life. In both cases the sutures were removed and the bleeding points secured. When the denuded strip includes the bladder mucous membrane, the cut margin may retract into the bladder and make the bleeding points quite inaccessible. Complete anæsthesia, a strong light, good position, and the skilful use of the speculum and uterine tenacula may then be necessary to evert and expose the bleeding surfaces and control the hemorrhage.

FIGURE 322.



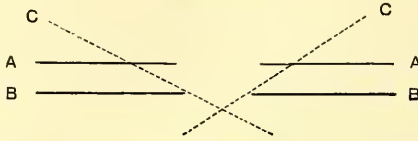
This cut is taken from a standard work, and shows how the denudation should *not* be made.

Emmet condemns the common practice of simply denuding a strip of uniform width around on the vaginal side of the fistula. He insists that the margins be denuded to the vesical mucosa. The denudation at the angles of the fistula should, however, be extended some distance over the vaginal surface, as shown in Figure 321. Unless this is done there will be a double fold or pucker at each angle. One may illustrate this by picking up together two small folds of a napkin, and observing that they extend a considerable distance before they can be smoothed

down to the common surface; so with the vaginal folds at the two ends of the improperly denuded fistula; the denudation must be so extended that they are lost on the level of the vagina. Unless this precaution is observed, the union at the angles is apt to be imperfect, and at these points may fail altogether. See Figure 321.

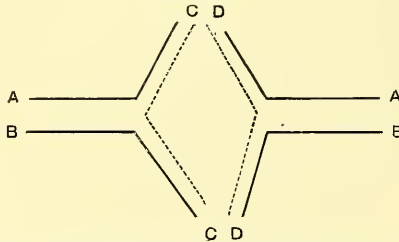
5. *Application of Sutures.* Formerly the metallic suture, usually silver, was almost exclusively used. Now, with aseptic methods, any suture is adequate. The writer prefers silkworm-gut tied on the surface with an ordinary hard knot. The numerous devices for fastening the sutures by means of short metallic plates, quills, split shot, and other means are useless, harmful, or unnecessary.

FIGURE 323.



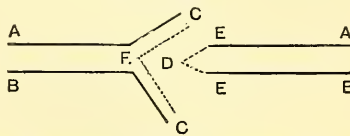
Beveling of the edges: A A, vaginal surface; B B, vesical surface; C, C, lines of denudation.<sup>1</sup>

FIGURE 324.



Flap splitting on both sides: A A, vaginal surface; B B, vesical surface; C C and D D, inner surfaces of split edges, and the ones to be coapted.<sup>1</sup>

FIGURE 325.



Flap splitting on one side and wedge denudation on the other: C F C and E D E are to be coapted.<sup>1</sup>

Emmet's or Sims' needle is the best adapted for ordinary use; it is short and straight except at the very point, which is slightly curved. Occasionally a full-curved needle may be of service. The needle is shown in Figure 326.

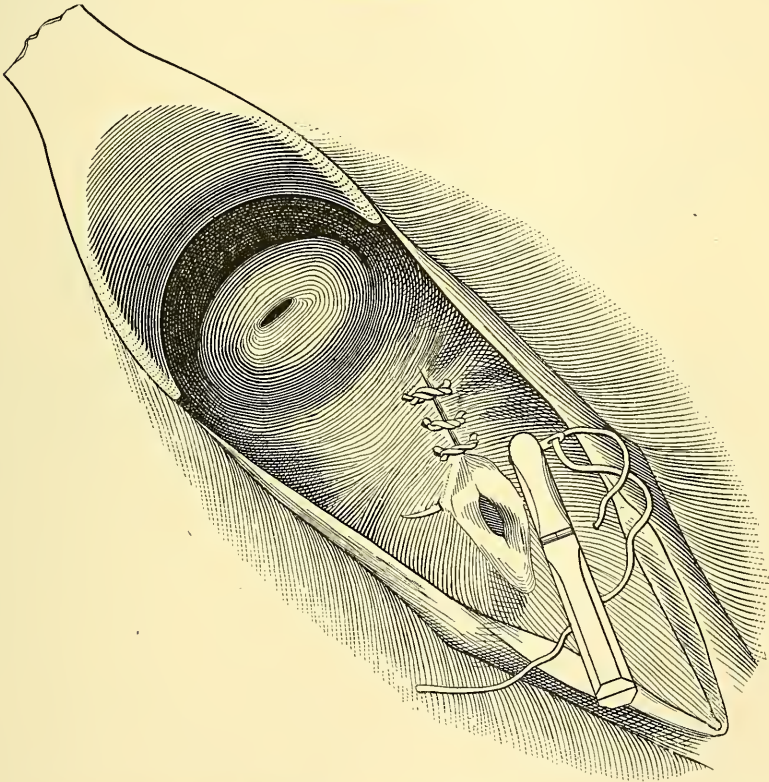
A needle-forceps without locking handles will enable a dexterous operator constantly to vary the direction of the needle during its introduction, and is therefore preferred.

The suture should be attached to the needle in the ordinary way, as a thread is attached to a common sewing-needle. The needle is grasped by the forceps and entered about one-eighth of an inch from the margin of the fistula on the vaginal side; it transfixes the vesico-vaginal

<sup>1</sup> Jenks, in American System of Gynecology.

wall and emerges on the bladder side, so as barely to include the vesical margin ; it is then passed through the wall on the opposite side in the inverse order, and brought out one-eighth inch from the margin of the vaginal mucosa on that side. The sutures should be placed about one-sixth of an inch apart. If silver sutures are used they should be all passed and then secured by twisting. In using silkworm-gut the writer usually prefers to tie each suture as it is passed. Let the sutures be tied just tightly enough to hold the parts together. If tied too tightly they strangulate the tissues, cut out, and fail to give union.

FIGURE 326.



Closing of a vesico-vaginal fistula : introduction of a suture. Left latero-prone position ; exposure by Sims' speculum.

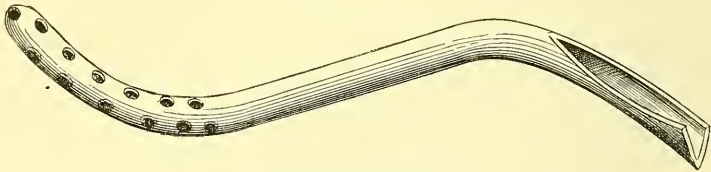
A clot of blood, if left in the bladder after closure, may cause great vesical tenesmus and possibly imperil the result. It is well, therefore, before tying the final sutures to throw a quantity of sterilized water through the urethra into the bladder. This water will pass through the fistula into the vagina and wash out anything remaining in the bladder.

6. *After-treatment.* The patient is placed on the back, with a roll under the knees for support. A self-retaining Sims sigmoid catheter is



placed in the urethra; it should be made of block-tin or glass or of some material easily bent; the curves may then be adjusted to the individual case. The urine passes through the catheter and is collected in a urinal placed between the thighs. The catheter is apt to become clogged with mucus or blood clots, and should, therefore, be removed and cleaned every few hours. A second catheter is desirable in order that one may always be introduced as soon as the other is removed. In case of small fistula one may dispense with the self-retaining catheter altogether and permit the patient to pass the urine in the natural way. Both patient and nurse should be cautioned to see that the flow of urine is not interrupted. The catheter should remain about fourteen days. The sutures, unless removed earlier on account of suppuration or failure of union, may remain twelve days or two weeks. The woman should be kept in bed a week longer.

FIGURE 327.



Sime's sigmoid catheter.

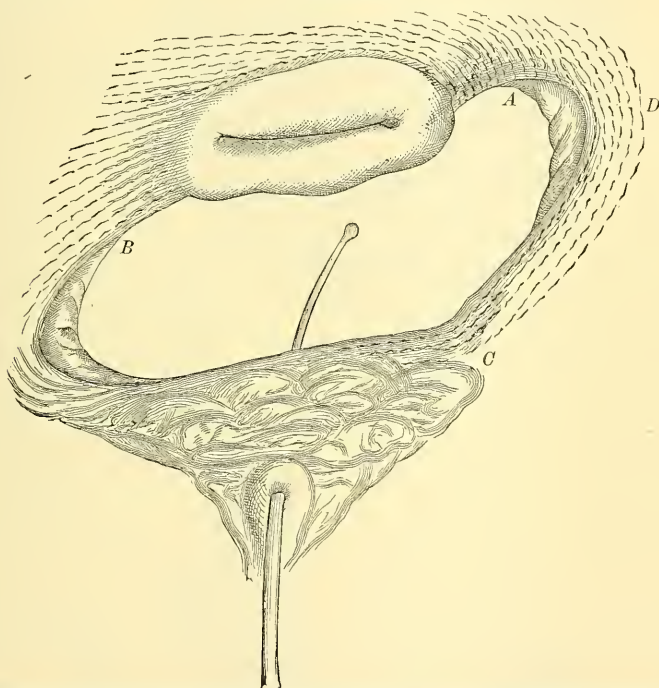
During convalescence the urine should be kept normally acid; otherwise, phosphatic deposits may form in the line of union and on the sutures and prevent or destroy union. The benzoic acid mixture already described should therefore be continued. The long retention of the catheter and the continued dorsal position may give rise to great discomfort; hence the necessity in many cases of using more or less morphine, opium, or other anodyne. A cathartic should be given on the third day, and thereafter the bowels kept regular by moderate catharsis and enemata. After the final removal of the catheter there may be retention of urine, and it may be necessary, therefore, in order to prevent distention of the bladder, to draw the urine every few hours. In old cases the bladder, either from disuse or from cystitis, may be much contracted, and therefore liable to distention from a small quantity of urine. The functional powers of the bladder and urethra progressively improve as the bladder gradually becomes accustomed to the retention of considerable quantities of urine. A bladder for many years contracted by vesico-vaginal fistula may regain its full capacity in a short time after closure of the opening.

#### Atypical Operations.

The ingenuity and skill of the operator will enable him to modify the operation according to the requirements of an atypical case. An operation may be only partially successful, and may have to be repeated again and again until the closure is complete, or it may be necessary to close the opening only in part at each one of several operations.

Loss of the Entire Vesico-vaginal Septum is usually associated with more or less destruction of cervical tissue and cicatricial development in the posterior vaginal fornix. The usual operation is to close by a transverse line of union—that is, to stitch the anterior lip of the cervix uteri to the neck of the bladder. In many cases the cervix is immovable and cannot be drawn down to the neck of the bladder until the post-cervical cicatrices have been freely divided by a deep transverse incision back of the cervix. If necessary to gain the required reach it is permissible to split the cervix bilaterally. Figure 329 shows the fistula closed by union of the cervix uteri to the neck of the bladder.

FIGURE 328.

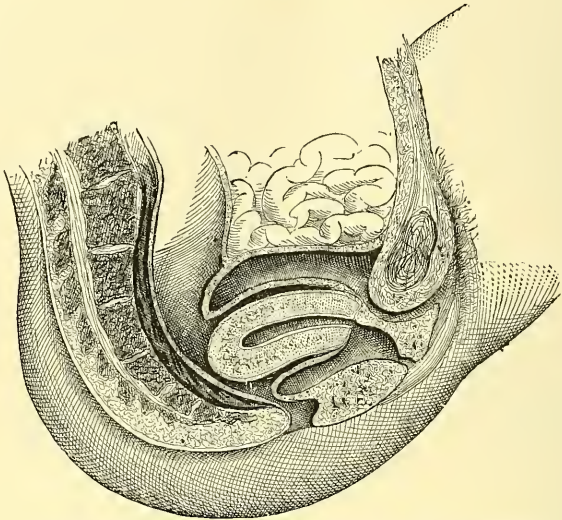
Fistula involving loss of entire vesico-vaginal septum as seen through the speculum.<sup>1</sup>

So much of the anterior lip may have sloughed away as to render its union with the neck of the bladder impossible. In such a case some operators turn the uterus into the bladder by union of its posterior lip to the neck of the bladder. This would establish a communication between the interior of the uterus and the bladder. A great risk from this operation is in the possibility that infection might pass from the endometrium to all the urinary organs or from the bladder to the uterus, Fallopian tubes, and even to the peritoneum. The chief danger, however, of such an operation is that it is apt to form a pouch in which urine may stagnate. If urine becomes alkaline, phosphatic,

<sup>1</sup> Emmet: Principles and Practice of Gynecology, second edition, p. 638.

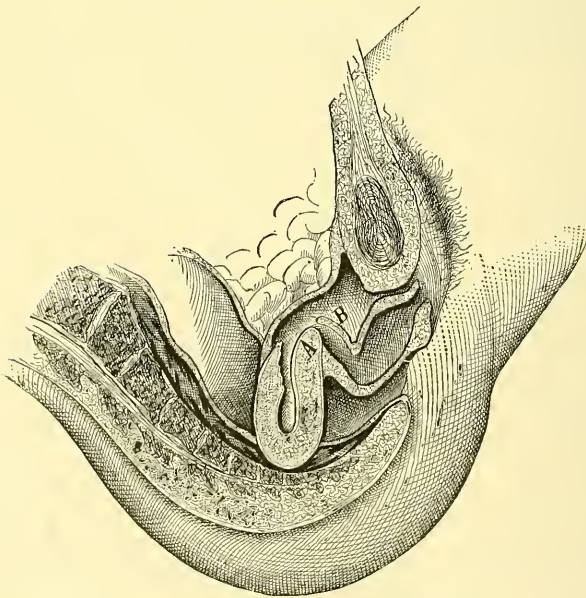
and infectious, cystitis follows, only to be relieved by reopening the bladder and giving it drainage. See Artificial Vesico-vaginal Fistula

FIGURE 329.



Anterior wall of cervix uteri united to the neck of the bladder.<sup>1</sup>

FIGURE 330.



Uterus turned into bladder to secure retention. Points between *A* and *B* united. Anterior lip of cervix sloughed away. Uterus retroverted.<sup>2</sup>

<sup>1</sup> Emmet: Principles and Practice of Gynecology.

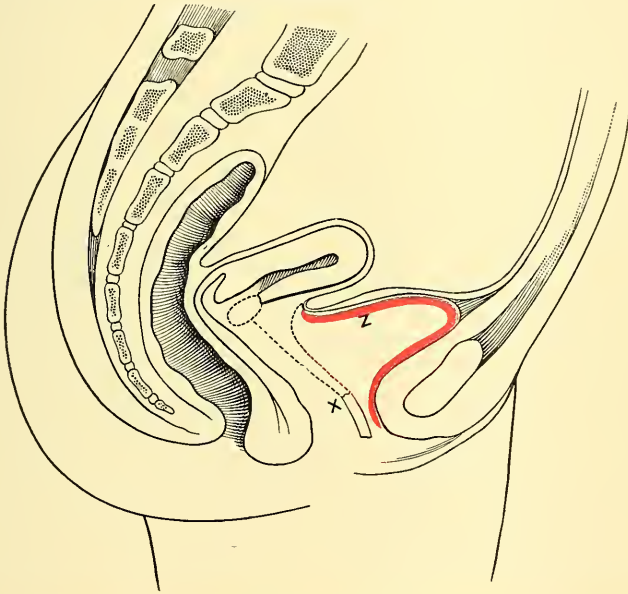
<sup>2</sup> Ibid.



for Cystitis, page 281. If the fistula be closed so as to avoid the formation of such a pouch, the result may be good; it is, unfortunately, sometimes impossible to avoid.

*Kolpopleistis*, or closure of the vagina, is an operation designed to secure retention of urine in cases of otherwise inoperable vesico-vaginal fistula. It is performed by denuding a wide strip all around the vaginal outlet just within the vulva and uniting the denuded surfaces upon themselves by means of interrupted sutures. The effect is to make one cavity of the bladder and vagina. This cavity receives the urine, menstrual blood, and uterine secretions. The operation always leads to results more distressing than the condition for which it has been invoked.

FIGURE 331.



The dotted lines show the parts which had sloughed out. Red line shows remaining portion of bladder wall.

Emmet, in the strongest terms, condemns the operation and urges that it never be done in any case. He advises that the parts be made to heal with the opening unclosed, and that the patient be kept as comfortable as cleanliness and care can make her without an operation. The stagnant urine constantly present in the vaginal pouch formed by the operation always produces intolerable, not to say dangerous, disease of the urinary organs.

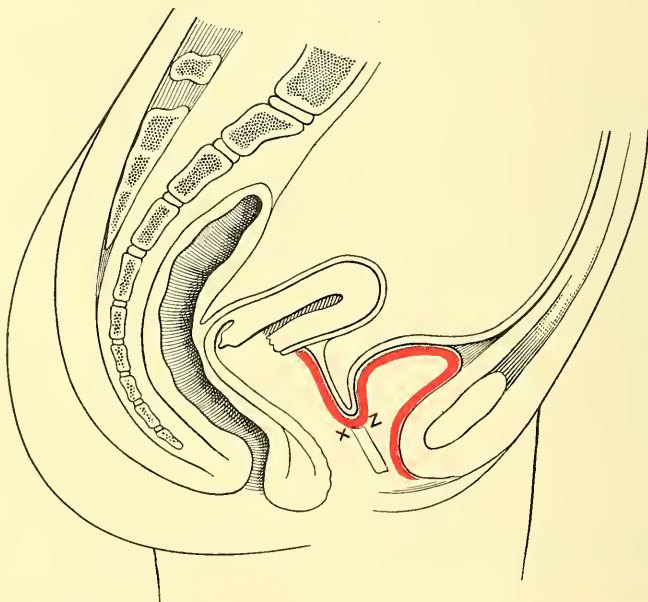
The writer offers two instructive cases from his own practice.<sup>1</sup>

Case I.—The entire vesico-vaginal septum, the vaginal portion of the cervix, and anterior wall of the cervix to the internal os had sloughed away, leaving no bladder tissue between the inner extremity

<sup>1</sup> E. C. Dudley: Journal American Medical Association, March 27, 1886.

of the urethra and the point corresponding to the plane of the internal os uteri. See Figure 331. The upper and lower fragments of the opening could not be approximated—that is, the anterior wall of the uterus could not be approximated to the neck of the bladder after the method shown in Figure 329. The only operation which at first seemed possible was to unite the posterior wall of the cervix uteri to the neck of the bladder, as shown in Figure 330. This would have turned the uterus into the bladder, and menstruation would have taken place through the urethra; but while this was under consideration it was found, on further examination, that the mucous membrane of the bladder, if caught with the tenaculum about an inch in front of the uterus, could be drawn to the neck of the bladder—that is, to the lower margin of the fistula, and held there without undue traction. A strip of mucous membrane across the bladder was therefore denuded

FIGURE 332.



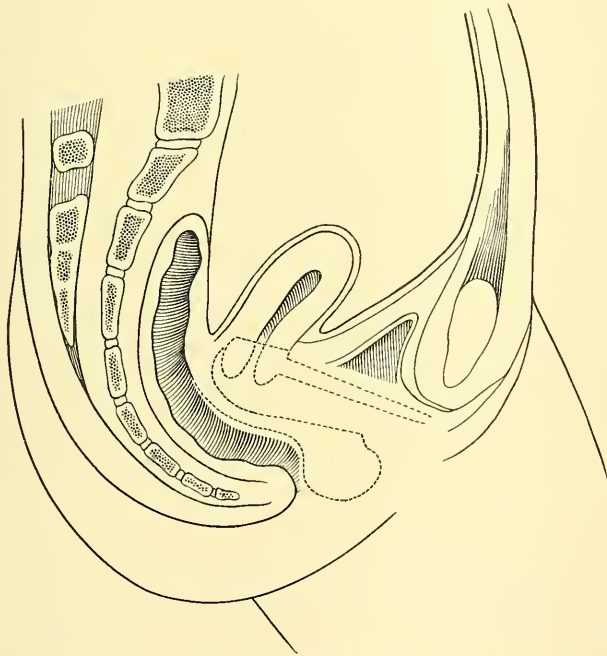
Section at  $\times Z$  shows the fundus of the bladder stitched to the neck of the bladder.

from side to side an inch in front of the uterus. This denudation was continued around the lateral and lower margins of the opening. The strip of denuded surface across the bladder was then drawn down and stitched to the lower margin of the fistula. Thus the bladder was divided into two parts, the upper closed part communicating with the urethra and receiving the urine from the ureters; the lower open part replacing the lost anterior vaginal wall. In other words, the part of the bladder wall, situated between the line of denudation across the fundus of the bladder and the uterus, was utilized as a substitute for the lost vesico-vaginal septum and anterior wall of the cervix. Twenty-two sutures were used. Notwithstanding the failure of the nurse on

the third day to keep the catheter in place, and the consequent accumulation of several ounces of urine in the bladder, union by first intention was complete. The bladder, although reduced in size by the operation, has normally performed its functions ever since. It is large enough to enable the woman to retain her urine all night. The writer is not aware than another similar operation has been recorded.

Dr. Howard Kelly, of Baltimore, suggests a plan which might be adopted to great advantage in place of the one just described. It is to dissect the bladder entirely free from the uterus, so as to make a free, wide opening between the vagina and the peritoneum—that is, to make an anterior vaginal section. The bladder-wall, anterior to the

FIGURE 333.



The dotted lines indicate the parts destroyed by slough. The perineum was not destroyed but was completely torn apart.

uterus, thus free from its uterine attachments, may then be drawn down so as to close the fistula by a transverse line of sutures.

Another possible method which has been suggested for such cases is to detach the bladder laterally and bring the edges of the fistula together laterally from side to side without obliterating the vagina. The uterus also has been utilized as material for the closure of a fistula.

Case II.—Mrs. G. A. M., patient at St. Luke's Hospital, Chicago. The injury in this case was more extensive than would ordinarily be repaired by plastic surgery. The cervix uteri to the level of the internal os, the vesico- and urethro-vaginal septum, and the recto-vaginal septum had entirely sloughed away; the perineum was completely lacer-



ated through the sphincter ani muscle. The fundus of the inverted, ulcerated, and semi-strangulated bladder protruded through the pelvic outlet. This outlet was bounded by the sides of the vulva, by the posterior and lateral margins of the anus, and by the pubes. Thus all control both in urethra and anus was lost. The uterus was occluded by contracted cicatricial tissue and full of retained menstrual fluid.

Clearly the conditions would discourage any effort at repair by ordinary methods. The problem was fourfold, and as follows:

To reopen the closed uterine canal and release the imprisoned menstrual fluid.

To replace the lost vesico-vaginal septum.

To replace the lost urethro-vaginal septum.

To replace the lost recto-vaginal septum and reunite the sphincter ani muscle.

A free incision with sharp-pointed scissors into the uterus reopened the uterine canal and re-established normal menstruation.

The labia minora were much hypertrophied, and were therefore capable of supplying abundant material for the replacement of the lost vesico-vaginal wall; to this end, together with the adjacent tissue around and below them, they were dissected up from above downward, but not detached at their lower ends. An area on each side just within the vulva, close to the margin of the bladder mucous membrane, was freshened by denudation and splitting, and the edge of each corresponding labium turned in and stitched to it with silkworm-gut sutures. The flap thus formed on the right side united perfectly to its transplanted position; that on the left partly sloughed. The right transplanted labium now took its nutrition through the lower uncut end and the new tissues to which it was united. It was not possible, however, at the first transplantation to carry the labium sufficiently high to unite it with the upper margin of the bladder mucosa; it would not reach far enough to fill out the space left by the sloughed-out vesico-vaginal septum; in order to make it reach the transplanting operation had to be done three times—that is, the labium was turned end for end upon itself three times, and finally planted in place of the lost vesico-vaginal wall. One face of this labium was now the bladder side, and the other was the vaginal side of the restored vesico-vaginal wall. In order to maintain the nutrition of the flap during the period of its transplantation, several months were allowed to intervene between the transplanting operations. Finally, after numerous attempts in which sometimes a little was gained and sometimes nothing, the margins of the flap were united to the margins of the opening at every point and the integrity of the vesico-vaginal septum was restored.

The urethra was repaired by denuding two parallel strips, three-quarters of an inch apart, on either side of the urethral site, and uniting them one to the other by interrupted silkworm-gut sutures. This formed a new urethro-vaginal wall.<sup>1</sup> The remnant of the left labium minus was utilized in this part of the work. The urethra thus formed immediately gave a measurable degree of retentive power when the

<sup>1</sup> This is the operation proposed by Emmet: Principles and Practice of Gynecology. See chapter on Malformations.

woman was lying down. The bladder, however, was much contracted from cystitis, and, having but small capacity, was at first of necessity often evacuated.

The recto-vaginal septum was replaced by drawing down the loose rectal wall from above into the gap, and after denudation uniting it to the lateral walls of the vagina with fine buried catgut sutures. At the same time the completely ruptured perineum, including the sphincter muscle, was reunited. The bowel and sphincter ani muscle at once resumed their normal functions.

Nineteen operations in all were performed before this result was reached.

The patient now, about two years after her discharge from the hospital, reports perfect control of the bowel and practically perfect control of the urethra. In a recent letter she writes: "I have almost perfect control of the urine at all times; I say *almost* because of there being a slight weakness at times; but it is not often, and even then the *amount* of leakage is not great. I have taken up the study of shorthand, typewriting, and telegraphy, and if I make a success of it shall feel that my life has not been a failure."

This case, although a curiosity in surgery, illustrates what may sometimes be accomplished by sustained effort; little by little, line by line, in the face of one discouragement after another, the work was done. The treatment continued over a period of more than two years, with an intermittent period of three years, when nothing was done. Most of the time it seemed like following the forlorn hope; now total failure, then a little success until, finally, nineteen operations under anæsthesia had been done. Words fail to describe the bravery and patience displayed by this woman, or the difficulties and discouragements which the surgeon must meet in such a case.

#### VESICO-UTERINE FISTULA.

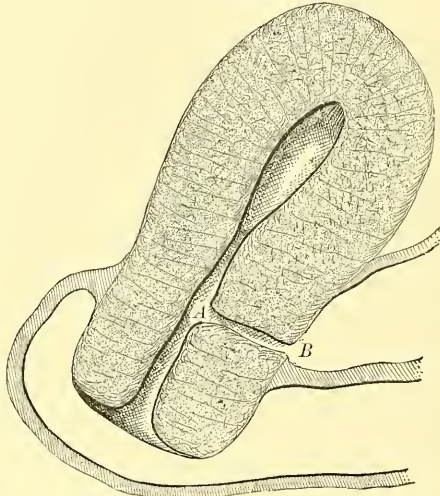
This form of fistula has already been mentioned on page 465, under Laceration of the Cervix; it is the result of an anterior laceration of the cervix extending into the bladder. Usually the effort of nature to repair the injury produces union in the lower part of the laceration so as to repair the whole vaginal part of the injury. Figure 334 shows the sinus extending from the bladder, *B*, to the interior of the uterus, *A*.

The diagnosis is based upon the history of the case and the passage of urine through the os externum. The treatment is to reproduce the original tear by an incision through the anterior lip of the cervix directly down into the sinus. The fistula thus exposed at the angle of the laceration is denuded, and the whole wound, including the fistula and the cervical laceration, closed with silkworm-gut sutures. Except that the sutures, in addition to closing the cervix, are also made to close the opening into the bladder, the operation does not differ from the ordinary operation for closure of an anterior laceration of the cervix uteri.

## URETHRO-VAGINAL FISTULA.

This form of fistula is sometimes intentionally made by a surgical operation in the treatment of urethritis and other diseases of the urethra; it is occasionally the result of ulcerative processes. If the neck of the bladder is not involved, the functional power of the urethra to retain urine may be unimpaired. The operation for closure is the same as that described for vesico-vaginal fistula. The after-treatment consists of the twice daily hot water douche. The self-retaining catheter is not required. Ordinary catheterization is permissible, but if the woman can pass the urine without help, is not required.

FIGURE 334.

Vesico-uterine fistula. A. Endometrium. B. Bladder.<sup>1</sup>

## URETERO-VAGINAL FISTULA.

One or both ureters may open into the vagina. The condition may be a congenital defect, or the result of sloughing from pressure necrosis, or of the ulcerative processes of malignant or specific disease; hence the classification into two varieties, congenital and acquired.

The diagnosis is made by passing a ureteral catheter into the ureter at the point whence the urine escapes. In the congenital form there is no communication between the ureter and the bladder. The acquired form may or may not be associated with a vesico-vaginal fistula. If so associated the ureteral opening is usually in the margin of the vesical opening. This combination is called a *uretero-vesico-vaginal fistula*.

The treatment of a uretero-vesico-vaginal fistula is as follows: First, split the uretero-vesical wall for a little distance back from the margin of the vesical opening. This makes a new and larger opening for the

<sup>1</sup> Emmet: Principles and Practice of Gynecology, second edition, p. 635.



ureter into the bladder remote from and out of the way of the vesico-vaginal fistula. The latter may then be closed in the usual manner.

If the uretero-vaginal fistula is not associated with a vesical opening, it should be converted into a uretero-vesico-vaginal fistula by an incision at the uretero-vaginal outlet directly through into the bladder. The operation is then continued as above described for a uretero-vesico-vaginal fistula.

## RECTO-VAGINAL FISTULA.

### Causes.

Parturition, although a frequent cause, is relatively at least a less frequent cause of recto-vaginal than of vesico-vaginal fistula; the lesion is more frequently observed as the result of syphilis or cancer. Occasionally a peri-anal abscess is situated in the perineum, and in the acute stage breaks into both the vagina and the lower bowel, or, later, the perineum may be perforated from the anus to the vagina by the burrowing of pus. These cases are apt to be syphilitic or tuberculous.

### Diagnosis.

The diagnosis is made by digital or speculum examination, or by injecting milk into the rectum and observing the point at which it appears in the vagina.

### Prognosis.

The lesion, when due to cancer, is incurable; when the cause is syphilis, the operation for closure, unless preceded by adequate specific treatment, usually fails. A sinus of tubercular or other inflammatory origin should be successfully closed by suture, but the prognosis is much improved by such preliminary treatment as will improve the general nutrition. In fistula due to pressure necrosis the operation of closure by suture, although beset by more unfavorable conditions than in urinary fistulæ, usually succeeds.

### Operation.

The principles are the same as for urinary fistulæ. The preparation is the same as for closure of the completely lacerated perineum—that is, free catharsis during several days before the operation, and the use of such food and intestinal antiseptics as will reduce to the minimum the amount of gas and other material in the bowel; much depends upon making the bowel as nearly as possible aseptic.

The operation often fails from the pressure of gas and other rectal contents against the newly-united wound; hence in order to give, during the healing process, the clearest practical outlet for the rectum, the sphincter ani muscle should be thoroughly and widely stretched.

*The denudation and passage of sutures* should be on the vaginal side of the recto-vaginal wall, and should extend to but not into the rectal mucosa. The object is to make the operation, so far as possible, in the more favorable soil of the vagina. In order to insure thorough

denudation of the whole sinus clear to the margin of intestinal mucosa, the index-finger of the left hand in the bowel is made to roll the rectal margin toward the vaginal opening, and thereby render it accessible for denudation by means of the properly-curved scissors. In a very small fistula the sinus may be inaccessible for denudation until it has been made so by free incision on the vaginal side. Such incision should not extend into the rectum. As in urinary fistulæ broad surfaces for union should be denuded on the vaginal wall. The method of suture is the same as for vesico-vaginal fistula.

#### ANO-VAGINAL FISTULA.

In ano-vaginal fistula the sinus runs through the perineum, and may, therefore, be inaccessible for denudation. The sinus may then be laid open by a perineal incision. This may be on the vaginal side, and need not necessarily divide the whole sphincter ani muscle. Most operators, however, divide the entire perineum between the sinus and the cutaneous side of the perineum. The remaining steps of the operation then are to denude freely and deeply the now exposed walls of the sinus, and then close the wound as in the operation for complete laceration of the perineum. The advantage of complete division lies in the immobilization of the muscle. Unless severed, it may by its almost ceaseless relaxation and contraction, imperil union. As a corollary, it follows that if the muscle is not wholly divided, it should be partially divided or at least thoroughly divulsed. It is better to divide the muscle, at least to divide all but a few fibres. The after-treatment is the same as for operations in urinary fistula and complete perineorrhaphy.

#### Priority in the Operation for Genital Fistulæ.

Until forty years ago, when the operation for the closure of vaginal fistulæ was developed and, in practical form, given to the world by the late Marion Sims, this most distressing injury had been incurable. The introduction of Sims' speculum, which made the operation possible, has a significance, however, more far reaching than the mere recognition of a valuable operation, for it marks an epoch in the history of gynecology. The operation furnished the initiative for the period of great practical activity which followed.

It will in no respect detract from the credit which justly belongs to the great pioneer if we admit the fact that the honor of perfecting and perpetuating the methods upon which his operation was based, and upon which modern gynecology has made its greatest development, must be divided between Marion Sims and Thomas Addis Emmet.

## PART V.

### DISPLACEMENTS OF THE UTERUS AND OTHER PELVIC ORGANS. MASSAGE.

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#### CHAPTER XLIV.

##### DISPLACEMENTS OF THE UTERUS.

###### General Considerations.

THE title of this chapter is not to be taken in a restricted sense, for the uterus is anatomically so connected with adjacent organs that its displacements cannot be intelligently considered or satisfactorily presented without at the same time incidentally taking into account the displacements, causative, resultant, or concurrent, of the ovaries, Fallopian tubes, rectum, vagina, bladder, and perineum.

The following pathological sequence will serve as an example. The vaginal outlet may be so injured in labor as to cause a displacement of the perineum backward toward the coccyx, where it can no longer serve as a bulwark against the downward force which is exerted in the expulsion of the contents of the bladder and rectum. The force of straining at stool and of urination is now exerted against the less resisting bladder and rectal walls; they consequently pouch into the vaginal outlet. The downward displacements thereby produced are called cystocele and rectocele. The vaginal walls are attached to the uterus, and, being displaced downward, must, by traction, pull that organ to a lower level. The uterus in turn is connected with the bladder, rectum, Fallopian tubes, and ovaries, and in its own descent draws these organs out of place and disturbs their relation to one another. This shows how a uterine displacement may be both causative and resultant. Concurrent displacement of the uterus and other pelvic organs may result, for example, from the downward pressure of a tumor or from inflammatory causes.

It conforms to usage and is therefore convenient to treat the subject of displacements of the pelvic organs under the heading Uterine Displacements. At the same time it must be held clearly in mind that a uterine deviation may not be the essential factor in the morbid sequence; on the contrary, it may, as already stated, be only an incident. The subject, therefore, properly includes the displacements not merely of the uterus, but of all the pelvic organs. It further embraces the relations which these displacements may bear to one another, and to such



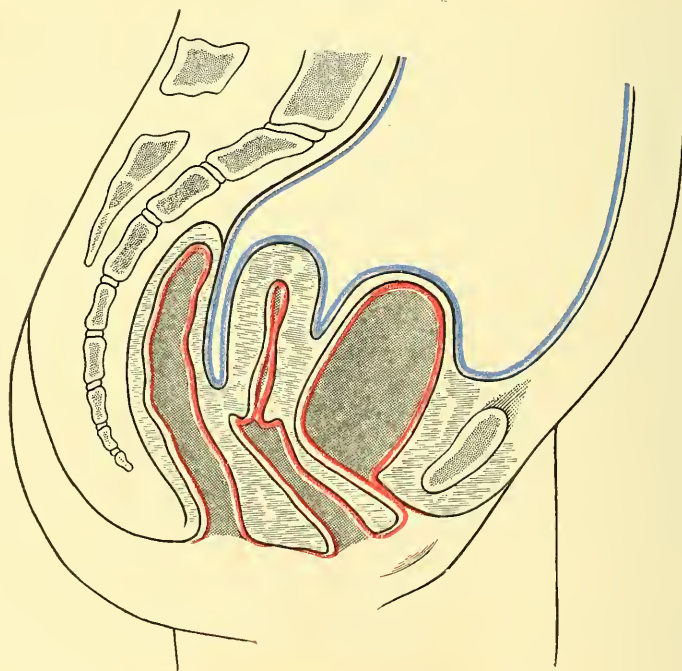
associated lesions as inflammation, tumors, traumatism, and congenital defects.

The importance of a distinction between location and position will become apparent hereafter; by the former is meant the situation of the organ regardless of its attitude; by the latter is meant the attitude alone. To change an object from one place to another is to change its location; to turn it over or bend it upon itself is to change its position.

#### Normal Position of the Uterus.

In the works on anatomy and gynecology which we are accustomed to consult the uterus is represented as having a straight or nearly straight canal—as lying about midway between the symphysis pubis and the hollow of the sacrum, its axis corresponding to that of the pelvic inlet. They generally agree that its position is one of slight, and only slight, anteversion; some admit that slight anteflexion may not be in-

FIGURE 335.



Classical representation of the pelvic organs.

jurious, but most would pronounce the organ anteverted or anteflexed to a degree that would endanger health if by digital examination its anterior wall could be felt through the anterior wall of the vagina. The classical idea of the normal position of the uterus wrongly presupposes a distended bladder and rectum occupying the anterior and the posterior thirds of the pelvic cavity. Such an arrangement would

leave for the uterus only the intermediate space, and would constitute a condition seldom or never realized in health.

Suppose a straight line coincident with the vesico-vaginal wall, Figure 335, to be continued through the cervix to the sacrum. This line represents approximately the antero-posterior diameter of the pelvis. The length of the vesico-vaginal wall is two and a half inches, and, supposing the cervix to be just midway between the symphysis and the sacrum, the distance from its posterior wall to the sacrum must also be two and a half inches. Add to the sum of these two parts of this antero-posterior diameter one inch for the cervix, and the antero-posterior diameter of the pelvis becomes six inches instead of the normal four and one-third, which proves that the cervix must normally be much nearer to the hollow of the sacrum than to the symphysis. Since the length of the vesico-vaginal wall plus the diameter of the cervix measures three and one-half inches, it follows that the distance from the posterior wall of the cervix to the hollow of the sacrum must be the difference between four and one-third and three and one-half inches, or five-sixths of an inch. These measurements are approximations.

Again, suppose the uterus, Figure 335, to be carried bodily upward and backward, its axis remaining the same, until the cervix reach its normal position near the hollow of the sacrum; then would the body of the uterus impinge upon the bony sacrum. It is therefore clear that the anteversion must be the normal position, because the uterus and sacrum would otherwise occupy the same space.

Figure 336 represents, according to Schultze,<sup>1</sup> the location and position of the virgin uterus and its surroundings, the bladder, the rectum, and vagina being empty and collapsed. The angle of about 90° which the cervix forms with the vagina measures the forward inclination of the cervix, but is subject to slight variations in consequence of the physiological movements of the uterus. The body is furthermore bent forward upon the cervix, so that its anterior surface rests upon the empty bladder. The angle of the normal ante flexion, according to careful measurements by Schultze, is about 48°; Fritsch says that 90° is the physiological limit. This question will be further considered under the subject of pathological ante flexions.

#### Normal Movements of the Uterus.

Strictly, the uterus can have no absolutely normal position or location, because it has a certain normal range of movements which depend to some extent upon respiration, intra-abdominal forces, and locomotion, but more especially upon the varying quantity of material in the rectum and bladder. Its normal position, then, varies within the limits of its normal movements. If the body of the uterus rests upon the bladder it must rise as the bladder becomes distended, and, con-

<sup>1</sup> *Achiv für Gynäkologie*, 1875, Band viii, p. 134, and *Lageveränderungen der Gebärmutter*, Berlin, 1881. Ely Van de Warker makes a full and critical study of the normal movements of the unimpregnated uterus, in the *New York Medical Journal*, vol. xxi, p. 337; and of the normal position and movements of the unimpregnated uterus, in the *American Journal of Obstetrics*, vol. xi, p. 314. His conclusions substantially agree with the later observations of Schultze.

versely, if the urine be drawn through a catheter while the woman is lying on her back, the uterus, notwithstanding the opposing influence of its own weight, immediately follows the receding wall of the bladder and returns through an arc of  $45^{\circ}$ , or possibly even  $90^{\circ}$ , to its accustomed position.

FIGURE 336.



Correct drawing of the pelvic organs. Semi-diagrammatic.

The full rectum forces the uterus in the opposite direction, toward the symphysis, and thereby counteracts the influence of the full bladder. This anterior movement is, however, somewhat limited, and is confined to the cervical portion, except when the body has been forced back into close proximity with the rectum by the over-distended bladder.

#### Normal Supports of the Uterus.

The uterus is maintained in its normal position and location by the pelvic floor, of which the uterine ligaments are an essential part.

The *uterine ligaments* are physiologically in a state of relaxation; the state of tension would be pathological; they do not fix the uterus; they only tend to limit its movements to their normal range. Backward



displacement of the body is resisted by the round ligaments, backward displacement of the cervix by the utero-vesical ligaments and by the vesico-vaginal wall. Forward and downward displacements are resisted by the utero-sacral ligaments, and excessive lateral motion by the broad ligaments. This restraining power is doubtless greater in the utero-sacral than in any of the other ligaments.

*The pelvic floor*,<sup>1</sup> which is the chief support of the uterus, is divided into two segments, the pubic and sacral.<sup>2</sup> The pubic segment includes bladder, urethra, anterior vaginal wall, and bladder peritoneum; it is attached in front to the symphysis pubis, and laterally to the anterior bony walls of the pelvis. The sacral segment includes rectum, perineum, posterior vaginal wall, and strong tendinous and muscular tissue; it is attached to the coccyx, to the sacrum, and to the posterior wall of the bony pelvis.

Permeating the pelvic floor in all directions, entering into the composition of its single parts, binding them together, and sending its processes to the bony pelvis, is the pelvic connective tissue, upon the integrity of which depends the integrity of the pelvic floor as a uterine support. Its pernicious influence when diseased is considered elsewhere. The old idea that the uterus is supported by the vaginal walls or by the perineum or by the uterine ligaments is obsolete; they are important parts of the pubic and sacral segments, and as such contribute their share, but the pelvic floor as a whole supports the uterus. The various uterine supports are to a great extent the seat of motor influence. They consequently not only resist excessive movement, but also serve to return the organ from its physiological migrations.

**Definition and Nomenclature of Displacements.** In the foregoing pages the normal location, position, movements, and supports of the uterus have been defined. Those conditions are pathological which induce changes to positions or locations beyond the defined limits, or which so fix the organ that its normal movements are prevented. The displacements are divided into mal-locations and malpositions.

The mal-locations, in which the uterus occupies a place outside its normal limits, are as follows:

Ascent.	Ante-location.
Retro-location.	Lateral location.
	Descent.

The malpositions are determined by excessive change in the inclination of the uterine axis. They are further divided into flexions, in which the organ is bent upon itself in an abnormal degree, manner, or direction, and versions, in which the axis of the unflexed uterus inclines in an abnormal degree or direction. The malpositions therefore are:

Retroversion. ~	Lateral flexion.
Retroflexion.	Anteversion.
Lateral version.	Anteflexion.

<sup>1</sup> For a description of the female pelvic floor, see Hart's Atlas.

<sup>2</sup> Hart and Barbour's Manual of Gynecology.

## Symptoms and Diagnosis in General.

Each variety of displacement may be indicated by its own group of symptoms and physical signs. These will be presented in the study of special displacements. To avoid repetition, those symptoms and signs which pertain to no special displacement, but which belong to all alike, will be mentioned at once. They may arise either from the displacement itself or from its possible complications, of which the following are examples: Metritis, ovaritis, salpingitis, atresia, stenosis, cystitis, vesical catarrh, rectitis, rectal catarrh, perimetritis, peritonitis, uterine catarrh, tumors, and cicatrices.

Uterine displacement may be a cause or an effect of associated complications, or, together with them, it may be a concurrent result of some common cause, or it may have had primarily no pathological connection with them. The symptoms of displacement refer to the pelvic organs or to the nervous system. Among the symptoms which refer to the pelvic organs are difficulty in walking and standing, pelvic pain, more or less constant; dysmenorrhœa, menorrhagia, sterility, frequent abortion, constipation, painful or difficult defecation, dysuria, polyuria and tenesmus. Among the symptoms which refer to the nervous system are, neuralgia in various parts, paralysis, hysteria, nervous dyspepsia, anæmia, chlorosis, and spinal irritation.

The final diagnosis must always depend upon direct examination of the uterus itself. The first division of the above group of symptoms is not likely to escape notice as indicative of displacement, but the nervous symptoms are constantly disregarded or treated without reference to their possible pelvic origin. The frequent dependence of these nervous phenomena upon displacement is proved by their persistence in many cases after ordinary treatment, by their prompt disappearance upon permanent replacement and retention of the uterus by mechanical means, and by their usually prompt recurrence upon removal of the support. The presence, therefore, of the second division of the group or any part thereof, even though the first be absent, will justify, nay, even necessitate, a careful investigation into the state of the pelvic organs.

That examination which results only in giving the name to a special variety of displacement, and does not include the complicating lesions, would not furnish a sufficient guide to the therapeutic indications, and is therefore inadequate. The successful treatment, for instance, of an antelexion dependent upon inflammation of the utero-sacral ligaments must include the removal of the inflammation.

An important prerequisite to examination is the absence of material in the rectum and bladder. The full rectum distorts the vaginal walls, deprives the examiner of the space necessary for the introduction of the speculum, and throws the uterus out of its accustomed position. Much more troublesome is the presence of even a small quantity of urine in the bladder, because it causes the patient to render the abdominal muscles tense when the hand is placed over the lower portion of the abdomen for bimanual palpation, and makes it impossible to engage the uterus between the hand and the examining finger. The

distended bladder, by pushing the uterus upward and backward, makes bimanual palpation almost useless. It is not surprising that conflicting opinions are common, when one day the patient is examined with rectum and bladder full, another day empty; one day in the dorsal, another in Sims' or the knee-chest position; one day with the cylindrical or bivalve speculum, another day with Sims' or Simon's. The left-hand method of examination is incomparably superior to the right. The palmar surface of the index-finger is more easily directed toward the left side of the pelvis, which is especially subject to disease. Its tactile sense is more acute and more easily educated. The stronger right hand should be free to palpate the surface of the abdomen in conjoined manipulation.

For digital examination the dorsal position is preferred; the patient should be drawn close to the edge of a bed, or preferably a table, the thighs being flexed, the feet about fifteen inches apart, and knees widely separated. The examiner should stand facing the patient or at her left side. The index-finger of the left hand, properly lubricated, then slowly advances over the perineum into the vagina, noting the condition of the perineum, the presence or absence of cicatrices, lacerations, tumors, or relaxation of the vagina or perineum, the capacity of the vagina, the condition, size, and direction of the cervix, its distance from the sacrum and vulva, its mobility or fixation. Now, the right hand is pressed well down behind the pubes, and the uterus is engaged between it and the examining finger. See pages 56, 57, and 59. In this way the examiner may determine more accurately the position, location, and size of the entire organ; may detect the possible presence of complicating tumors, both inflammatory and non-inflammatory; may also note, if possible, the location and condition of the ovaries, which, especially in the posterior displacements, are liable to be prolapsed and excessively sensitive, and to constitute, therefore, a most intractable complication. The index-finger sweeps around the cervix in search of tender places which may be the result of inflammation or the expression of some neurosis. Above all, the digital examination requires a light, gentle, delicate touch. The index-finger may now be removed and reintroduced into the rectum, the right hand still being behind the pubes, or the cervix may be grasped between the index-finger in the rectum and the thumb in the vagina, picked up, as it were, between the finger and the thumb thus placed, and with the aid of the right hand behind the pubes thoroughly palpated. See Figure 23.

Adequate diagnosis of the position of the pelvic organs is usually made by touch and conjoined palpation. It is seldom necessary or desirable to sound or probe the uterine cavity in order to learn the position of the uterus; indeed, accurate information in the majority of cases can be more readily and more safely gained by touch alone. A tumor or inflammatory mass in the pelvis may be confused with the uterus. In such a case the uterus may be definitely located—relative position determined—by the sound or probe. When the uterine canal is thus explored the patient may be on the back, and the left index-finger in the vagina should be used as a guide. The bivalve and cylindrical specula are almost useless in explorations of the interior of



the uterus. The exploration is most effectually and gently made with Sims' speculum, the patient being in the left latero-prone position. In some cases the probe cannot be passed by any other method.

## CHAPTER XLV.

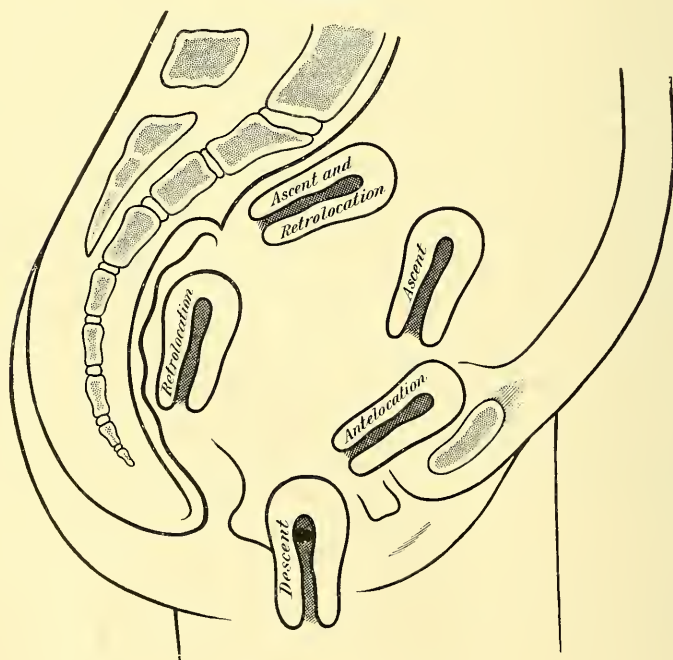
### MAL-LOCATIONS OF THE UTERUS.

Ascent. Retro-location. Ante-location. Lateral Locations.  
Descent or Prolapse.

#### ASCENT.

THIS mal-location may result from traction above or from pressure below. The organ may be drawn upward and backward by shortening

FIGURE 337.



Schematic drawing of various mal-locations.

of the utero-sacral ligaments, which results from inflammation and which usually induces a troublesome form of anteflexion. The enlarged

pregnant uterus sometimes becomes attached by adhesive inflammation to a portion of the peritoneum in one of the higher zones of the pelvis or in the abdomen, and the organ may consequently remain fixed in its elevated position after involution. A tumor connected with the uterus or its appendages which has grown too large to be retained in the pelvis may, upon rising into the abdomen, drag the uterus with it. Pressure below may come from excessive distention of the rectum or bladder, or from a large accumulation of menstrual fluid in the vagina, or from a tumor originating in any portion of the pelvis below the level of the uterus.

#### RETRO-LOCATION.

The uterus may be forced back into a post-normal location by the presence of a tumor in front or by the distended bladder, or it may be drawn back and fixed by peritoneal adhesions. Retro-location is liable to induce vesical irritation by putting the vesico-vaginal wall on the stretch, and thereby dragging on the neck of the bladder.

#### ANTE-LOCATION.

The causes of this displacement are similar to those which produce retro-location; they are: Distention of the rectum, post-uterine hæmatocele, post-uterine tumors, and peritoneal adhesions. Ante-location often causes vesical irritation, consequent upon the invasion by the uterus of that space which belongs to the bladder.

#### LATERAL LOCATION.

The entire uterus is often displaced to the right or the left by a tumor or by an inflammatory mass. In either case the uterus is crowded to the opposite side of the pelvis. After resolution of an inflammatory exudate the broad ligament and adjacent inflamed structures, shortened by inflammatory contraction, draw the uterus to the affected side and fix it there. Laceration of the cervix opens the way to infection, and is often therefore followed by inflammation in the parametrium on the corresponding side. Figure 162 shows the uterus crowded to one side by a myoma.

#### Diagnosis, Symptoms, and Treatment.

The diagnosis, symptoms, and treatment of the above mal-locations are wholly subordinate to the more significant lesions of which they are only the incidental results.

*The Treatment* of mal-locations due to inflammatory causes is that of the inflammation. Many cases yield readily to local massage. The indications for topical treatment and surgical measures, including operations on the uterus and its appendages and the removal of tumors, will

vary with the causative lesion. In many cases mal-locations of the uterus give rise to no symptoms, and therefore require no treatment. Pessaries are useless and may be harmful.

### DESCENT OR PROLAPSE.

The nature of this displacement is clearly indicated by its name. It is convenient to distinguish three degrees of descent. In the first the organ is displaced downward and forward until sufficient space has been gained between the cervix and the sacrum to permit the body to turn back into extreme retroversion; in the second the cervix descends to the vulva; in the third the uterus protrudes partially or wholly through the vulva. The third degree of descent is sometimes called *procidencia*.

#### Etiology and Mechanism.

Descent may be the result of any or all of the following causes:

1. Pressure from above.
2. Weakening of the supports.
3. Increased weight of the uterus.
4. Traction from below.

Either of the above conditions being the primary cause, the others singly or combined may result.

*Pressure from above.* Under this head may be included pelvic or abdominal tumors, ascites, fecal accumulations, tight or heavy clothing, and straining at stool.

*Weakening and relaxation of the uterine supports* may be consequent upon subinvolution, senile atrophy, abnormally large pelvis, increased weight of the uterus, puerperal traumatism, pressure from above, or traction from below.

*Increased weight of the uterus.* Among the pathological developments which cause increased weight are congestion, subinvolution, hypertrophy, hyperplasia, pregnancy, fluid in the endometrium, and uterine tumors.

*Traction from below* may be due to such causes as vaginal cicatrices, abnormally short vagina, and falling of the pelvic floor.

Utero-gestation, parturition, and the puerperium may be followed by increased weight of the uterus and weakening of the supports from subinvolution. Puerperal traumatism may injure the vaginal outlet and cause the vaginal walls to fall; these in turn may drag the uterus down after them; indeed, excessive descent of the vaginal walls usually originates in parturition. Obviously, descent of the vesico- and recto-vaginal walls, or, more comprehensively, the sacral and pubic segments of the pelvic floor, involves also concurrent descent of the uterus and its appendages. It is clear from the above that descent of the vagina must be studied in connection with the descent of the uterus.

In labor the anterior wall of the vagina is so depressed, stretched, and shortened by the advancing head that during and after the second stage the anterior lip of the cervix may be seen behind the urethra.



If the puerperium progresses favorably, with prompt involution of the uterus, vagina, perineum, and peritoneum, the relaxation of the vesico-vaginal wall and of the utero-sacral supports disappears and the uterus resumes its normal multiparous location and position. But if the enlarged uterus remain in the long axis of the vagina, with its fundus incarcerated in the hollow of the sacrum between the utero-sacral ligaments, and with its sacral supports so stretched that they cannot recover their contractile power, and with involution of all the pelvic organs arrested, the descent may not only persist, but may even progress with constantly increasing cystocele to the third degree of prolapse. The downward influence of the above conditions may be materially increased by rupture of the perineum, and consequent prolapse of the recto-vaginal wall into a pouch called rectocele.

FIGURE 338.



Uterus between first and second degrees of descent. Semi-diagrammatic.

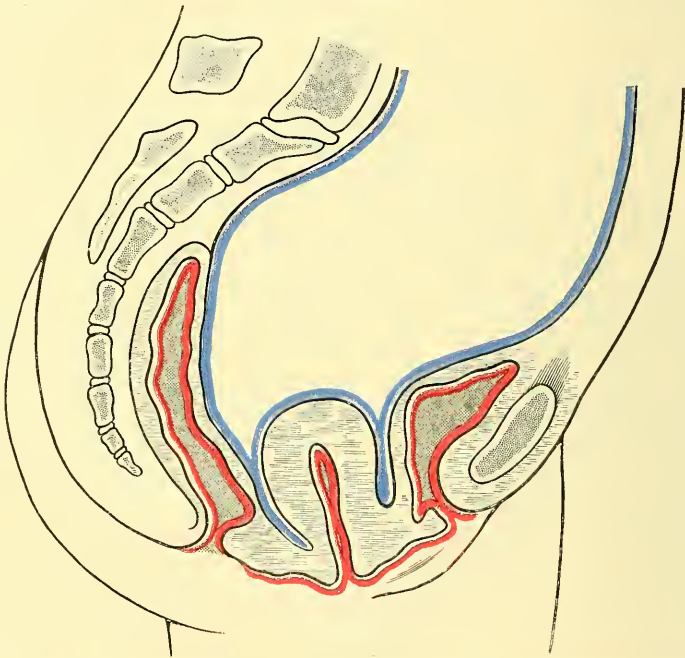
In the great majority of cases of complete prolapse the posterior vaginal wall in its descent is peeled off from the rectum, as shown in Figure 341, leaving the latter in its normal position. In rare instances the lower portion of the rectum is also found to have extruded in extreme rectocele, making a pouch below and in front of the anus where fecal matter may accumulate and remain in hard scybala. See Figure 340.

Obviously, complete prolapse of the uterus is only an incident to the prolapse of the pelvic floor. The whole mechanism is in all respects analogous to that of hernia. The extruded mass drags after

it a peritoneal sac, which, hernia-like, contains small intestine. This sac forces its way to the pelvic outlet and extrudes through the vulva, having the inverted vagina for its covering.

In the first degree of descent, Figure 345, as we have said, the uterus is displaced downward and forward sufficiently to permit the body to turn back into retroversion; as already stated, the organ in its normal location cannot retrovert because in so doing it would impinge upon the bony sacrum. As a consequence of the first degree of descent there are two significant possibilities: *First*, as the uterus falls to a lower level, where it would crowd upon and irritate the bladder, its long axis usually changes so as more and more to conform to that of the vagina, the cervix moves toward the pubes and the

FIGURE 339.



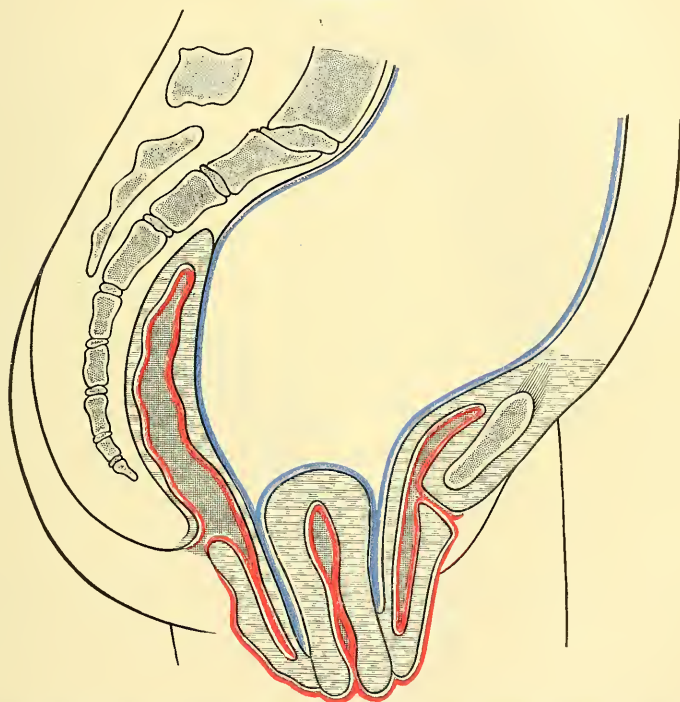
Second degree of descent. Cervix appears at vulva. Semi-diagrammatic.

corpus toward the sacrum—that is, it turns back away from the bladder into retroversion; this is as if the irritated bladder, in the protection of its own rights and territory, had thrown it back; *second*, instead of turning back into retroversion, the location of the uterus may simply change to a lower level, while the position remains the same—that is, the organ, still retaining its normal position of anteversion and anteflexion, may only settle to a lower plane. It must then occupy space which belongs to the bladder. The normally anteverted and anteflexed uterus in such descent is much more palpable to digital examination, and for this reason the vesical irritation consequent upon the descent has often been wrongly attributed to the anteversion

and antelexion. In this way has arisen much confusion in the effort to draw the line between normal and pathological anterior positions. The prompt relief which follows permanent replacement of the organ to the normal location, even though in so doing its ante-position be exaggerated, proves that such symptoms depend upon the mal-location, not upon the ante-position. The importance of a clear distinction, therefore, between location and position becomes apparent. See page 516.

Another cause of vesical irritation is the dragging of the uterus upon the neck of the bladder. This traction occurs not only in ascent, but also when the organ descends below a certain level.

FIGURE 340.



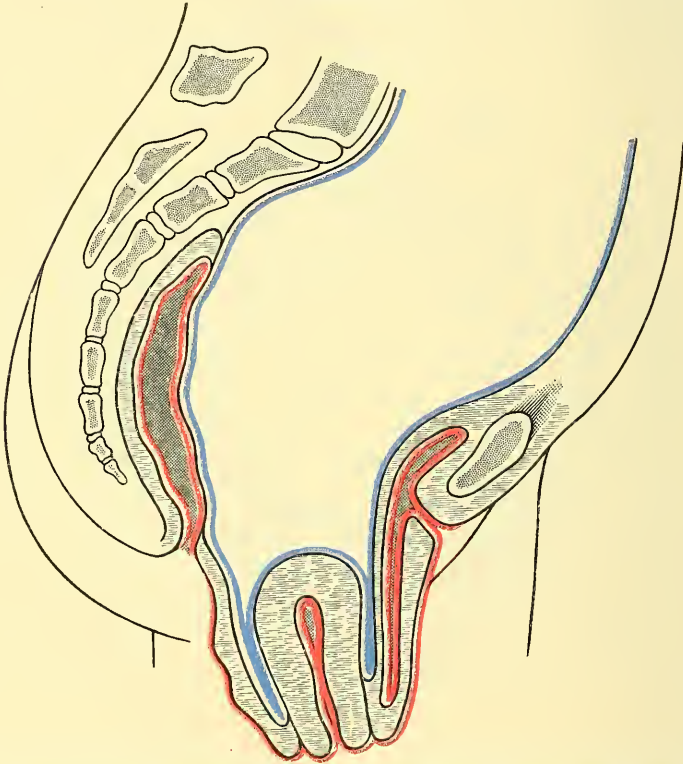
Complete or third degree of descent. Rectocele forms a pouch where scybala may accumulate  
Semi-diagrammatic.

In the foregoing paragraphs traction due to the falling pelvic floor has been discussed as a cause of descent. The impairment of the uterine supports may, however, be such that, instead of falling and dragging the uterus after them, they simply permit it to descend along the vaginal canal by the force of its own weight, and to carry with it the reduplicated vaginal walls. This influence is generally enforced by the increased weight of the diseased organ. The vagina more readily becomes a track for the descending uterus when from any cause the normal forward direction of the vaginal canal changes toward the vertical; this change in the direction of the vagina may occur either as the result of forward displacement of its upper extremity or of a retro-



displacement of its lower extremity. The former involves ante-position of the cervix, the latter backward displacement of the perineum. For a full discussion of backward displacement of the lower part of the vagina and vulva toward the coccyx, see *Laceration of the Perineum and Injuries to the Pelvic Floor*, in Chapters XL. and XLI. When the uterus descends along the track of the vagina, the long axes of the two organs will correspond; hence, such descent must involve a degree of retroversion. See Figure 345.

FIGURE 341.



Complete or third degree of descent. Vaginal wall peeled off from rectum, leaving rectal wall in normal position. Semi-diagrammatic.

#### Pathology.

The pathology may involve all the displaced organs. The circulation throughout the pelvis is impeded by traction upon the vessels; the entire pelvic contents therefore become the subject of venous congestion, with consequences disastrous to local innervation and nutrition. The ovaries and Fallopian tubes suffer concurrent displacement. That portion of the peritoneum which enters into the formation of the uterine ligaments and of the pelvic floor is dragged along with the uterus. The vagina, also displaced, may become hypertrophied, swollen, and inflamed.

Sometimes the cul-de-sac of Douglas is distended by downward pressure of the intestines, by a small tumor, or by ascitic fluid, and a consequent hernial sac may protrude into the vagina through some portion of the posterior vaginal fornix. The anterior fornix is subject to a similar accident. These conditions are designated *enterocele vaginalis anterior* and *posterior*.

In the third degree of descent the vagina, now rolled out and exposed to external conditions, is no longer lubricated and protected by normal secretions, and therefore becomes dry, parchment-like, œdematous, eroded, and perhaps ulcerated.

FIGURE 342.

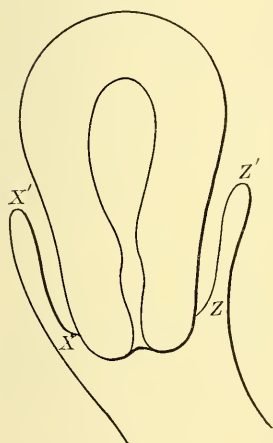


FIGURE 343.

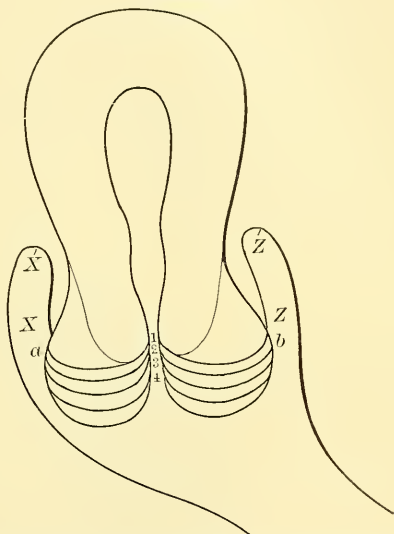


Figure 342.—Descent of the virgin uterus into the vaginal canal, showing the reduplicated vaginal walls. The utero-vaginal attachment, points X and Z, appears to be at X' and Z'. The apparent increase of length in the vaginal portion of the cervix, due to the reduplication, is measured by the distance from X and Z to X' and Z'.

Figure 343.—Descent of the uterus, showing excessive circular enlargement of the lacerated cervix, consequent upon reduplication of the vaginal walls and out-rolling of intracervical tissues. The divided fragments of the os externum are at a and b. The curved lines forming the angles 1, 2, 3, and 4 indicate the gradual process of the eversion. The angle of the laceration originally at point 1 has been forced down by the swelling and out-rolling of the mucous and submucous tissues of the cervix to point 4. The apparent os externum is at point 4. The utero-vaginal attachment X and Z seems to be at X' and Z'. The vaginal portion of the cervix therefore appears much larger and longer than it actually is.

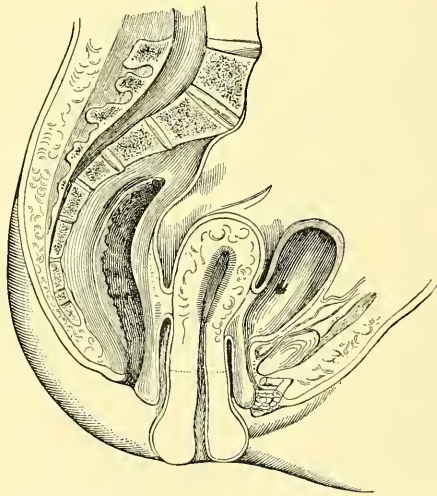
The rectum and bladder are subject to infection and chronic catarrh, and the bladder especially to concurrent descent. The uterus may be enlarged from any one or all of a variety of causes: congestion, subinvolution, hypertrophy, and hyperplasia. The cervix is often the seat of extreme erosion or so-called ulceration. The endometrium, in order to relieve the organ of its surplus blood, gives forth an excessive secretion of vitiated mucus. This is termed uterine catarrh. The enlargement of the uterus often pertains more to the cervix than to

the body, especially in prolapse of the second and third degrees. An explanation of this may be found in Figure 343.

Apparent elongation and disproportionate circular enlargement of the cervix are conditions which many standard authors wrongly call hypertrophic elongation and circular hypertrophy. The question of infravaginal elongation is easily settled by placing the patient in the knee-breast position. Then the uterus, by its own weight, falls toward the diaphragm, the reduplicated vagina unfolds, and the apparent utero-vaginal attachment, *X' Z'*, Figures 342 and 343, disappears, disclosing the actual attachment, *X Z*. Further, the point of the sound, passed into the bladder while the cervix is exposed by Sims' speculum, may be placed against the anterior wall of the cervix at *Z*, which would be impossible if the attachment were at *Z'*.

The comparatively small amount of hypertrophy in disproportionate circular enlargement is proved by the operation of trachelorrhaphy or by rolling in the out-rolled tissues with uterine tenacula, as shown in Figure 302. When the out-rolled intracervical mucous tissues are rolled in, the proper diameter of the cervix is restored, and a laceration on one or both sides, extending past the vaginal attachment, becomes apparent.

FIGURE 344.



This cut is from a standard text-book. It is reproduced to illustrate the current misconception of complete prolapse and apparent elongation of the cervix. The apparent elongation almost invariably disappears on replacement of the uterus. The appearance of elongation is due to congestion and vaginal reduplication. The dotted lines are introduced to show the old idea of where the cervix should be amputated. An amputation through this part would, however, be apt to involve the bladder in front and the cul-de-sac of Douglas behind. No such condition has ever been satisfactorily demonstrated.

Those cases in which the reduplication of the vaginal walls does not almost entirely explain the great elongation so-called, or in which great disproportionate circular enlargement has not been caused by laceration of the cervix, are the rare exceptions. Formerly these mechanical conditions were attributed to hypertrophic changes, and



were regarded as adequate indications for the removal of the cervix. Such elongation as is shown in Figure 344 rarely if ever exists.

Emmet, with his enormous experience, has never seen such a case, and denies its existence. Any one who will take the trouble to replace the uterus, and then, after a few moments, measure the uterine canal with the probe will be convinced that the elongation was due to strangulation of the vessels and consequent congestion. The condition simulates that of the erect penis, and therefore disappears when the circulation is re-established. The great merit of having secured general assent to the foregoing propositions, and of having given to the subject a new and right direction, must be accorded to Emmet. The cervix now is seldom amputated, except for malignant disease. Hypertrophy and hyperplasia usually cause a nearly symmetrical enlargement of the entire organ.

Congestion of the prolapsed uterus consequent upon obstruction in the stretched and displaced veins is often so extreme as to induce a state analogous to erection. Measurements by the probe just before and a few minutes after replacement generally show a very appreciable decrease in the length of the uterine canal. If the prolapse has been of the third degree, the difference may amount to one or even two inches. It is important not to confound the enlargement of congestion with increase in the solid constituents of the organ. See *Laceration of the Cervix*.

#### Symptoms and Course.

A dragging sensation and pelvic and abdominal pain are generally present. Rectocele and cystocele and rectal and vesical catarrh often cause painful and severe functional disturbances of the rectum and bladder. In descent of the third degree excoriations of the exposed vagina and cervix sometimes cause extreme suffering. The course is ordinarily chronic, but intercurrent attacks of acute vaginitis and pelvic peritonitis are not uncommon. The peritonitis sometimes effects a spontaneous cure by peritoneal adhesions which fasten the uterus in an elevated position and hold it permanently. The symptoms of descent may be so severe as to necessitate absolute rest in bed. In other cases they may be attended with very little discomfort.

#### Diagnosis.

The diagnosis is by inspection, palpation, and exploration. The prolapsed uterus may be distinguished from cystocele, rectocele, inverted uterus, and fibroid tumor by the presence of the os externum. The sound may be passed through the urethra into the cystocele, and the finger through the anus into the rectocele. The length of the uterus may be determined by the sound, the size, shape, position, extent of descent, and difficulty of replacement by conjoined manipulation.

#### Prophylaxis.

This requires such measures during labor as will prevent long and powerful pressure upon the pelvic floor. After labor any injury to the perineum should be promptly repaired. The vagina should be

kept clean by irrigations. The urine, if retained, should be regularly drawn and the bowels moved daily without straining. If conditions be present likely to induce subinvolution, such, for example, as pelvic infection or laceration of the cervix, they should receive treatment at the proper time. Undue relaxation of the pelvic floor necessitates a more prolonged rest in bed, the use of astringent douches, and, when the patient resumes the upright position, the application of a pessary. If involution goes on with the uterus congested and irritated by descent, the result is apt to be perpetuation of the displacement and its attendant evils; it is, therefore, highly desirable that the uterus be kept in place during the puerperium; to this end, even while the patient is in bed, a pessary may be indicated. The great prophylactic value of prolonged rest in bed for seven or eight weeks after labor is undeniable. The puerperium offers the best conditions for the cure of descent.

#### Treatment.

**Replacement.** The first indication is replacement, which, in the first and second degree of descent, is not difficult unless the uterus be held down by cicatrices or by a tumor. Complicating pelvic inflammations may render replacement dangerous or impossible, and may for a time contraindicate all direct treatment. Replacement of the organs from the third degree of prolapse is accomplished in the inverse order of their descent: First, the posterior vaginal wall, then the uterus, and last the anterior vaginal wall. Not infrequently the completely prolapsed uterus and pelvic floor, hernia-like, become strangulated. Then taxis will usually suffice; but it may have to be supplemented by hot applications, elastic pressure, anodynes, and the knee-breast position, and, should these fail, anæsthesia.

In exceptional cases of sudden descent, even to the third degree, replacement alone is sometimes followed by permanent relief; but if the descent has been gradual, it always recurs immediately after replacement. Measures are therefore required for the maintenance of the uterus in its normal location and position. This indication is fulfilled by hygiene, general and local treatment, massage, pessaries, and surgical operations.

The Hygiene principally relates to dress, food, and regular habit of the bowels. Undue pressure from above should, if possible, be removed. The clothing should be loose, and the weight of the skirts supported from the shoulders either by straps or preferably by buttoning them upon a waist made for the purpose. This waist is a good substitute for the corset, which, under all circumstances and in all forms, is injurious. See Chapter IX., on Dress. Constipation may cause and perpetuate the descent. Whatever impairs the general nutrition is a possible cause of relaxation in the pelvic floor. The accumulation of feces in the lower bowel mechanically irritates and may displace the pelvic organs; straining at stool exerts a strong downward pressure on the uterus and its appendages. Careful regulation of the bowels is therefore imperative; to this purpose food and exercise are the most essential agents. General tonics are useful.

**Massage.** The value of general massage for women unable to take active exercise is very great. Local massage after the method of Thurè Brandt will be found outlined in Chapter L. As a supplement to massage, or as an independent measure, one may strongly urge the knee-breast position. This position assumed several times a day causes the uterus to gravitate toward the diaphragm, and thereby gives temporary rest to the overburdened supports. While in this position the patient should separate the labia, so that the air may rush in and the vagina become expanded. The measures enumerated above, together with rigid care of the diet and of such other hygienic requirements as the individual case may demand, are essential as adjuvants to the more special treatment which almost every case requires.

**Pessaries.** The first change in the genesis of retroversion and retroflexion is descent; hence, the principles of mechanical treatment must be substantially the same for each. The reader is therefore referred to the indications, the contraindications, modes of adjustment, and uses of pessaries in the treatment of retroversion and retroflexion.

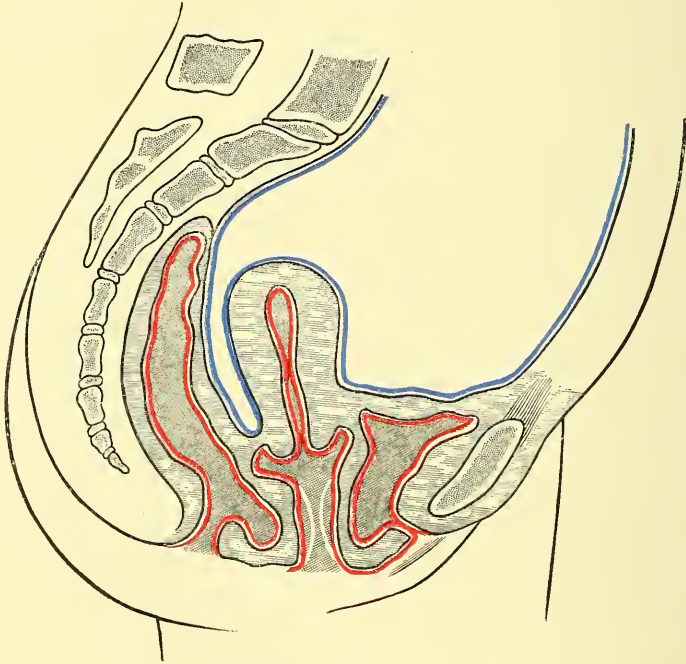
In complete prolapse dependent upon extensive injuries to the perineum and other parts of the pelvic floor, and associated with extreme subinvolution and relaxation of all the pelvic organs, the axis of the vagina is changed from its forward oblique to the vertical direction. See Figure 345. The downward traction of the prolapsing cystocele and rectocele upon the fornix of the vagina may then be so great that the pessary is inadequate to maintain in place the upper extremity of the vagina. The cervix then moves forward, the corpus turns back, and the whole uterus easily descends in a vertical direction along the prolapsing walls of the vagina to the second or third degree of prolapse. In this condition pessaries which disappear within the vagina are liable to be forced out with the prolapsing pelvic floor, or, if retained, seldom maintain the uterus in position. In such cases the various cup pessaries, which are supplied with external attachments and abdominal belts, are often used; but they either so fix the uterus as to prevent its normal movements, or hold it in such unstable equilibrium that it may assume any one of the various malpositions—*anterior, posterior, or lateral*; they are open to the further serious objection of constantly reminding the patient of their presence, and for these reasons are not approved. Pessaries of this class, however, are permissible in cases of complete prolapse, when the patient refuses surgical relief. As an expedient, the uterus may sometimes be held within the pelvis by means of a large Albert Smith pessary, with extreme uterine and pubic curves; see *Application of Pessaries in the Treatment of Retroversion*. The rational treatment, however, requires, first, an operation on the anterior vaginal wall to restore the fornix of the vagina to its normal place in the hollow of the sacrum, and with it the attached cervix; second, an operation at the vaginal outlet to bring the posterior vaginal wall well in contact with the anterior, and thereby to restore the lower extremity of the vagina, together with the perineum, to its normal place under the pubis.

**Plastic Operations.** The numerous plastic operations for the relief of complete descent of the uterus are divisible into two classes:



1. Operations designed to hold the uterus up by narrowing the vagina so much that the uterus cannot pass through it, and, consequently, must be maintained somewhere in the pelvis above the vaginal constriction. These operations usually consist of the removal of an elliptical piece from the anterior or posterior wall of the vagina, or from both; or of making longitudinal denudations and bringing the edges of the exposed surfaces together from side to side. In this class of operations no effort is made to restore the normal axes of the uterus or the vagina. The whole purpose is to make the vagina so narrow that the uterus cannot pass through it.

FIGURE 345.



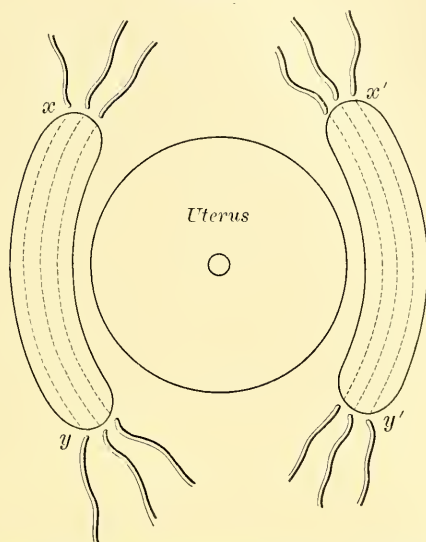
Uterus in line with the vagina; first degree of descent. The white lines in the vagina show where it would be narrowed by the first class of operations.

Operations of this class generally fail, because they do not restore the normal angle between the uterus and the vagina. The constricted vagina, indicated by the white lines in Figure 345, cannot resist the downward force of the uterus, which almost invariably dilates the vagina a second time, forces itself through, and reproduces the hernia. Moreover, the operation does permanent harm, because it shortens the vagina, thereby making it draw the cervix away from the sacrum toward the pubes. This forward movement of the cervix, as already stated, is an essential element in the genesis of descent.

2. Operations designed to hold the uterus in position by restoring the normal angle between the long axis of the uterus and the long axis of the vagina, may somewhat narrow the vagina, but such narrowing

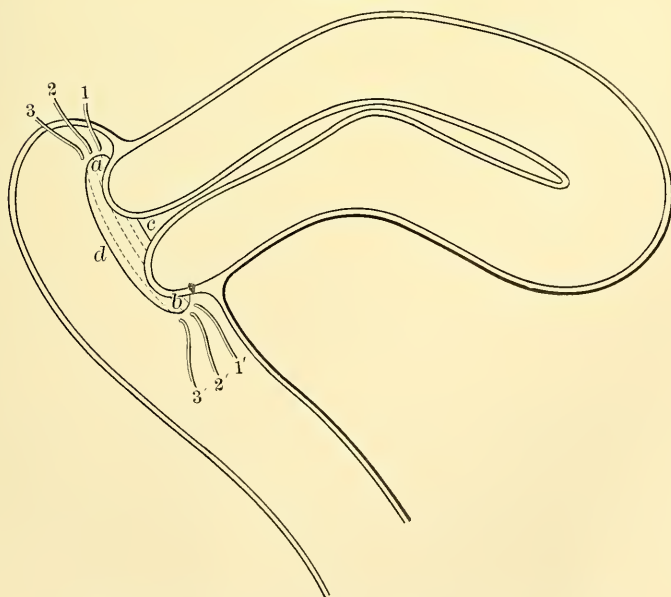
is only an incident rather to be regretted than desired. It is not essential to the success of the operation.

FIGURE 346.



Lateral denudations as seen looking through the speculum. Sutures in place but not tied.  
Diagrammatic.

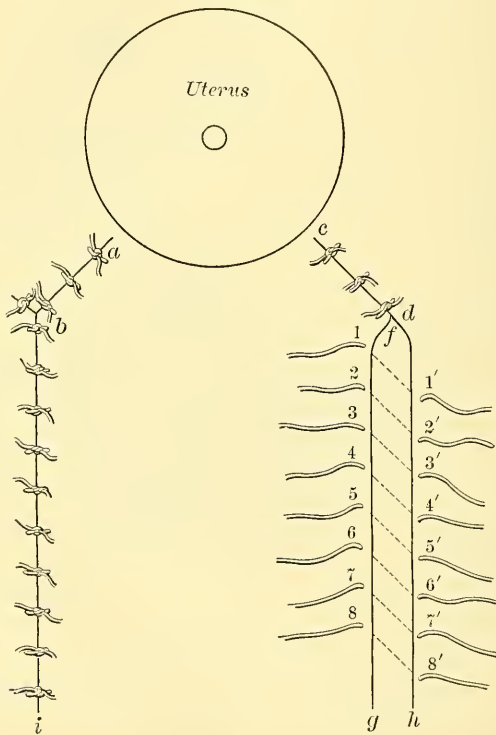
FIGURE 347.



Lateral denudations on one side in sagittal section. Diagrammatic.

There are two rational indications: first, to fix the upper extremity of the vagina in its normal location within an inch of the junction of the second and third sacral vertebrae, just where the utero-sacral ligaments would hold it if their normal tonicity and integrity could be restored; second, to bring the lower extremity of the vagina forward, so that its posterior wall shall be close up against the pubes; this would restore the normal obliquity to the vagina, and would hold the cervix so far back toward the sacrum in the direction of least resistance that the uterus must be forward in its normal anteverted position of mobile equilibrium. These two indications are best fulfilled by lateral elytrorrhaphy and perineorrhaphy.

FIGURE 348.



Showing the sutures in place before tying on the right side and after tying on the left.

*Lateral Elytrorrhaphy.* The operation about to be described is lateral elytrorrhaphy.<sup>1</sup> It is performed with the patient under anaesthesia, in Sims' position and with the vagina exposed by means of Sims' speculum. The blade of this speculum is perforated at its extreme end. Before the speculum is introduced the cervix is attached to the end of its blade by means of a temporary suture which is passed through its posterior lip and then through the perforation in the

<sup>1</sup> E. C. Dudley: New York Journal of Gynecology and Obstetrics, July, 1894.

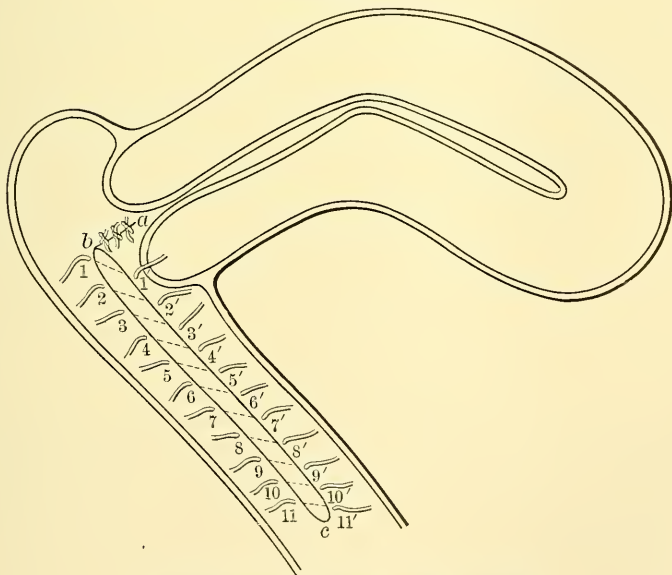


speculum, and tied. This temporary stitch, while the sutures are being applied, holds the cervix far back in the hollow of the sacrum; it should be removed at the end of the operation. When the cervix is thus held back in its normal location by the speculum, the space anterior to the uterus is so increased that the uterus readily falls forward into a position of decided anteversion. It is essential that the operation be done with the organ in this position. The first step in the operation proper is to denude two semicircular strips,  $xy$  and  $x'y'$ , Figure 346, in the vaginal wall close to the uterus, about one-third of an inch wide, on either side of the uterus, their concavity being toward the cervix, as shown in Figures 346 and 347. Figure 347 is a section, and shows the denudation only on one side of the cervix.

Each denuded surface is then closed upon itself by means of silkworm-gut sutures. Figures 346 and 347 show the sutures as introduced before tying. Figure 348 ( $ab$  and  $cd$ ) and Figure 349 ( $ab$ ) show the lines of union after the sutures have been tied.

In the folding of these denuded surfaces upon themselves their lower extremities,  $y$  and  $y'$ , are brought in contact with their upper extremities,  $x$  and  $x'$ , Figure 346. By this means the cervix is lifted bodily upward and backward.

FIGURE 349.

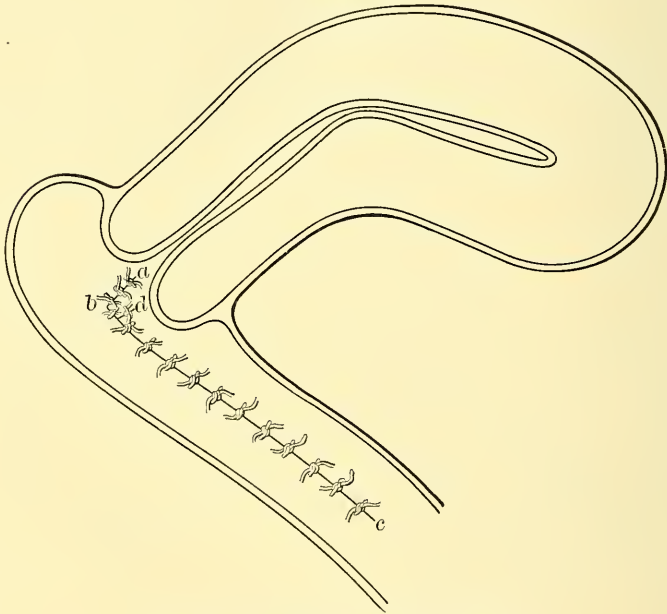


Lateral sutures on one side, passed but not tied.

The next step in the operation is to denude two strips about a quarter of an inch wide, extending from points  $b$  and  $d$ , to points  $i$  and  $g$   $h$ , Figure 348, and from point  $b$  to point  $c$ , Figure 349, along the lateral sulci of the vagina to the vaginal outlet, terminating in the lateral sulcus of the vagina on either side of the urethra. The lateral edges of each of these two denuded surfaces are now brought together by means of

sutures passed, not transversely across the denuded strip, but obliquely (see sutures 1—1', 2—2', 3—3', etc., Figures 349 and 350). One side of each of these denuded strips is adjacent to the anterior vaginal wall, and the other is adjacent to the posterior vaginal wall. Upon tying these obliquely placed sutures, Figures 349 and 350, it will be seen that point 1 is brought into coincidence with point 1', point 2 with point 2', and so on. The effect of this method of suturing when applied to both sides of the vagina is to slide the anterior vaginal wall upward and backward on the posterior vaginal wall and to fix it there. The line of union made by suture *d*, Figure 350, closes and disposes of the redundant margin of the wound produced by sliding the anterior wall up on the posterior. The cervix uteri, being so to speak in the

FIGURE 350.



Lateral sutures tied and operation complete.

anterior vaginal wall, must participate in this upward and backward movement. The fascia and other structures which compose the lateral walls of the vagina are much more fixed than the corresponding structures in the anterior or posterior wall, consequently the sustaining power of sutures in this location is greater than in any operation on the anterior or posterior wall. My own experience of about ten years in this lateral operation has shown permanently good results so far as I have been able to follow the cases. The object accomplished by this operation is the restoration of the upper extremity of the vagina and of the anterior vaginal wall to its normal location and direction. By this means the cervix uteri is forced back to its normal location near the hollow of the sacrum, and thereby the body of the uterus follows the direction of least resistance into its normal anterior position.

*Perineorrhaphy.* It is most important to appreciate the fact that in nearly every case of procidentia the lower extremity of the vagina is displaced backward. This is consequent upon subinvolution of the vaginal walls, and especially upon subinvolution or rupture of the perineum or of some other portion of the vaginal outlet. Unless, therefore, the posterior wall of the vagina and the perineum can be brought forward to their normal location under the pubes, so as to give support to the anterior vaginal wall, the latter will again fall, will drag the uterus after it, and the hernial protrusion will be reproduced. The treatment, therefore, of complete procidentia must always include an adequate operation upon the perineum, or, more comprehensively speaking, upon the vaginal outlet. The operation must be so performed that it will carry the lower extremity of the vagina forward to the normal location close up under the pubes; then, if lateral elytrorrhaphy has been done, the whole vagina will have its normal oblique direction, and its long axis will make an acute angle to the long axis of the uterus. When this angle is maintained the uterus cannot easily turn the sharp corner which will bring its long axis into coincidence with that of the vagina, and cannot, therefore, readily prolapse. The writer, in a large experience, has observed recurrence of the prolapse in only one case.

*Contraindication to Elytrorrhaphy.* Elytrorrhaphy is usually unnecessary and therefore contraindicated in descent of the first degree. The special province of this operation is in complete prolapse or procidentia. The operation is further contraindicated by tumors and adhesions which render replacement and retention impossible, and in diseases of the uterus or its appendages which demand their removal. When such contraindications do not exist elytrorrhaphy and perineorrhaphy are usually at least quite as effective, and are therefore preferred to the more dangerous and mutilating operation of hysterectomy.

Hysterectomy, if indicated, should be performed by the vaginal route in the same manner as described for cancer on page 338. As an operation for procidentia hysterectomy is open to the following comments: Procidentia, as already shown, is descent not merely of the uterus, but also of the vagina, bladder, and rectum. Complete prolapse often occurs after the menopause, when the uterus has become an insignificant rudimentary organ. Its removal, therefore, is inadequate without further operation on the vaginal walls. Cases are numerous in which, after vaginal hysterectomy, the pelvic floor, and with it the vaginal walls, have again protruded through the vulva. The operation should always, therefore, include anchorage of the upper end of the vagina to its normal location by stitching the severed ends of the broad ligaments into the wound made by the removal of the uterus. The indication for perineorrhaphy is the same as after elytrorrhaphy. Elytrorrhaphy is, for various reasons, less strongly preferred for procidentia after the menopause than before. The writer's only failure to secure a permanent result was in a case of descent of a senile uterus. It is probable that hysterectomy is the better operation for many of the senile cases.

Other Operations designed to decrease the weight by the removal of a part of the uterus are of questionable value; increased weight may



arise from subinvolution, hypertrophy, congestion, hyperplasia, and tumors. The treatment of these conditions is described elsewhere.

Amputation of the cervix to lighten the weight of the uterus has been much practised in the so-called circular hypertrophy and hypertrophic elongation described on page 529. Since these two conditions are rare, if not indeed unknown, it follows that they could seldom furnish an indication for amputation of the cervix uteri. It is, in fact, difficult to imagine a class of cases in which this operation would be indicated.

Emmet's exposure of the true pathology in this class of cases has led to the substitution of trachelorrhaphy or of Schroeder's operation.

Tumors increasing the weight of the uterus and tumors exerting pressure from above or traction from below should, if possible, be removed.

Alexander's operation and abdominal hysterorrhaphy are described under the surgical treatment of retroversion and retroflexion. The object of these operations is to suspend the uterus from above. Hysterorrhaphy, which fulfils this indication much more satisfactorily than shortening the round ligaments, may be indicated in cases of extreme relaxation of the uterine supports and greatly increased weight of the uterus. Its results, however, will usually not be permanent unless it is supplemented by elytrorrhaphy and perineorrhaphy.

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## CHAPTER XLVI.

### RETROVERSION AND RETROFLEXION.

Etiology. Pathology. Symptoms. Course. Diagnosis.  
Prognosis.

#### RETROVERSION.

RETROVERSION is that position of the uterus in which the fundus is posterior to the axis of the pelvic inlet. If the cervix be in its normal place, near the sacrum, retroversion is scarcely possible, because it is prevented by the proximity of the over-arching sacrum. See Figure 336. The first degree of prolapse must, usually, precede any considerable backward turning of the uterus. When the cervix has been displaced downward and forward so far that its distance from the sacrum is equal to or greater than the length of the uterus, retroversion to any extent becomes possible. See Figures 351 and 352.

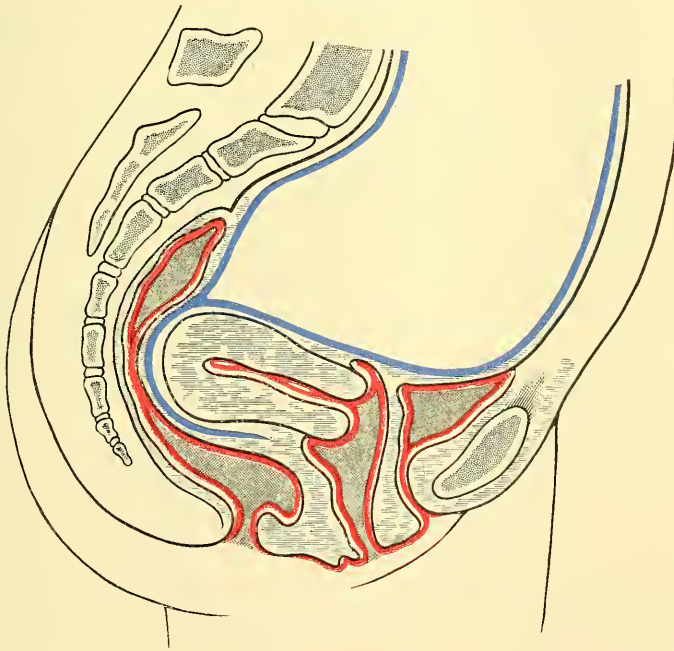
#### Etiology and Pathology.

From the above it follows that the causes of commencing retroversion must be identical with the causes of the first degree of prolapse. After the puerperium the relaxation of the supports and the weight of the displaced organ may persist, and this, together with the pressure and

weight of the intestines upon the anterior surfaces of the uterus, may prevent spontaneous replacement. Every act of defecation forces the cervix forward and downward, and the uterus, being in the axis of the vagina, and having, therefore, little support below, must depend for support upon the now inadequate subinvolved peritoneal suspensory ligaments and pelvic fascia. Abortion, with resulting increased weight and relaxation of the vaginal walls, is a common cause. Metritis, parametritis, perimetritis, peritonitis, salpingitis, and ovaritis are frequent complications, and may stand in the relation of cause or effect.

Congenital retroversion is rare. Retroposition for the small senile uterus after the menopause is not abnormal. Peritoneal adhesions and cicatricial bands may permanently fix the corpus in its retroverted position. In extreme retroversion the corpus is often incarcerated between the utero-sacral ligaments. Chronic cystitis and consequent contraction of the bladder shortens the vesico-vaginal wall, and thereby draws the cervix forward. This makes a permanent incurable displacement.

FIGURE 351.



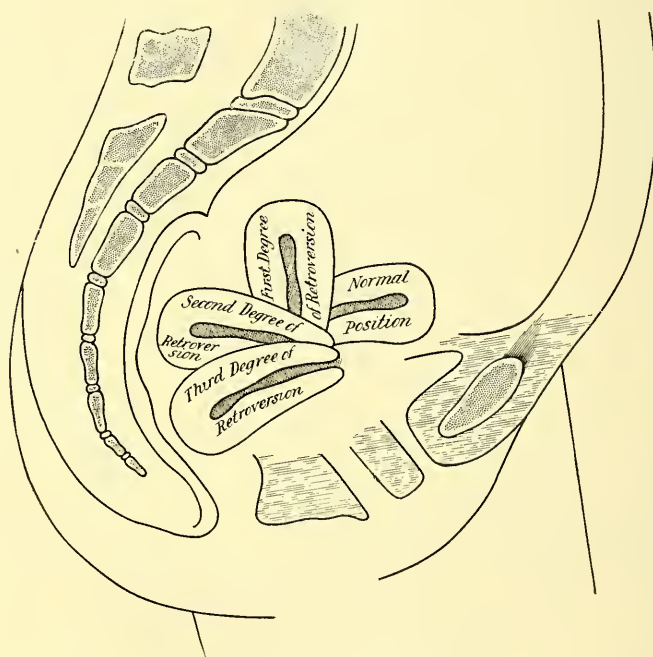
Retroversion.

### Symptoms and Course.

The displacement of retroversion and its numerous complications usually cause bearing-down sensations, a feeling of heaviness in the pelvis, exhaustion upon walking and standing, especially the latter. Constipation may be a cause or an effect. After the puerperium the extreme engorgement of the pelvic organs often contributes to hemorrhagic

endometritis. The hemorrhage then should not be confounded with the returning menstruation. The bleeding, especially after abortion, unless cured by treatment, often persists for a long time. Gradual or sudden replacement may occur spontaneously, or, the causes continuing active, the displacement may persist and even be reinforced by cystocele and rectocele. There is usually concurrent displacement of the ovaries and Fallopian tubes. Nutritive changes in the uterine walls may induce a superadded retroflexion. The heavy organ may descend along the relaxed, subinvolved vaginal walls even to complete procidentia.

FIGURE 352.

Degrees of retroversion.<sup>1</sup>

### Diagnosis and Prognosis.

The symptoms indicate the probability of displacement, but definite diagnosis depends upon direct examination. Conjoined manipulation will usually show the organ, if retroverted, with the cervix displaced toward the pubes and with the corpus in the hollow of the sacrum. In certain cases of anteflexion, as represented in Chapter XLVIII., the cervix is bent forward in the vaginal axis as in retroversion. The condition is in reality one of retroversion of the cervix, with high anteflexion of the corpus. Careful conjoined examination will usually clear the diagnosis. The prognosis, with treatment both for speedy relief and ultimate recovery, is generally favorable.

<sup>1</sup> Suggested by Penrose: Diseases of Women.



### Degrees of Retroversion.

Retroversion may be slight or extreme, according to the extent to which the axis of the uterus is turned back. Three degrees of the displacement are usually recognized, but the division is arbitrary, and, except for purposes of description, has no practical significance. See Figure 352.

### Treatment.

The treatment, as in descent, consists of the removal of the inflammatory and other complications, in the use of pessaries, and in surgical operations. Inasmuch as the treatment is similar to that of retroflexion, it will be presented together with the treatment of that displacement. See Chapter XLVII.

### RETROFLEXION.

Retroflexion is that displacement in which the organ is bent back upon itself. It usually, though not always, results from, and is asso-

FIGURE 353.



Extreme retroflexion with hypertrophy of the corpus uteri. The uterus impinges on and compresses the rectum.

ciated with, retroversion ; but, for convenience, the double displacement will be termed retroflexion.

### Etiology and Pathology.

Among the causes of retroflexion are great weight of the corpus uteri, the soft mobile state of the uterine walls so common during the puerperium, intra-abdominal forces, downward pressure during defecation, tight clothing, and the obstetric bandage. Metritis, perimetritis, either as cause or effect, are almost invariably associated with retroflexion. The displacement is not uncommonly due to the presence of a myoma in the posterior wall of the uterus. In rare cases the displacement is congenital, and the reproductive organs are then all underdeveloped.

The ovaries and Fallopian tubes, unless fixed elsewhere by adhesions, are usually held down on either side of the corpus uteri. They are sometimes much enlarged by inflammation, often adherent, and always extremely sensitive. Infection of the uterus and its appendages from bacterial invasion is almost invariably the essential cause. It often follows parturition, abortion, or injudicious treatment. Gonorrhœa and the puerperal infections are most frequent. Peritoneal adhesions between the corpus uteri and the pouch of Douglas may render replacement impossible, except by abdominal or vaginal section.

### Symptoms and Course.

The symptoms of pelvic inflammation predominate. Uterine discharges, menstrual disorders, sterility, abortion, weakness, pain in the back, painful defecation, rectal tenesmus, menorrhagia, and dysmenorrhœa are among the usual manifestations.

Uterine discharges, menorrhagia, and abortion are the result of endometritis, and are due to the effort of an engorged uterus to relieve itself of congestion by increased secretions or increased menstruation.

Abortion, dysmenorrhœa, and sterility may come of a wide range of associated conditions, chief among them the faulty nutrition of the woman, the inflammatory complications, and the mechanical obstruction in the uterine canal at the angle of flexure. The rectal symptoms are caused by the proximity of the inflamed uterus and its appendages to the bowel. This gives to the patient the sensation of a full bowel, and is therefore a cause of tenesmus. Passage of the bowel-contents through this sensitive zone is necessarily painful. Abdominal pains, nervous dyspepsia, neuralgia in distant parts of the body, and neurasthenia are often present; indeed, the nervous symptoms may be of the most exaggerated character, and may comprise all that is implied by the word hysteria in its most comprehensive signification.

Should pregnancy occur the rapid growth of the uterus may induce spontaneous reposition; this is most likely to occur when the fundus rises out of the pelvis at about the fourth month; but if the corpus be incarcerated under the sacral promontory from adhesions or from any other cause, the uterus, unless manually replaced, will relieve itself by a dangerous abortion.

### Diagnosis.

Digital touch discloses the cervix uteri low in the pelvis. The fundus uteri is felt through the posterior vaginal wall in the cul-de-sac of Douglas. Conjoined manipulation with the index-finger of the left hand, first in the vagina, then in the rectum, and the right hand over the hypogastric region, will show the size, form, consistency, and location of the uterus, the degree of flexion, and the difficulty of replacement. An inflammatory exudate or abscess posterior to the uterus, or a fibroid in the posterior uterine wall, may be mistaken for the retroflexed corpus. The probe is seldom necessary to verify the diagnosis. Its use is subject to strict antiseptic conditions, for otherwise additional infection may be introduced. In some cases of difficult diagnosis it is better at first to direct the treatment to the inflammation and defer the precise diagnosis of the displacement to a later date. Great and lasting injury is often done in the attempt to complete the diagnosis at the first examination. The presence of a myoma in the posterior uterine wall, with post-uterine inflammation, is a serious complication both in diagnosis and treatment. If the rectum be overloaded with fecal matter, a cathartic should be given and the complete digital examination deferred. The displacement is distinguished from the presence of an ovary or small ovarian tumor in the pouch of Douglas by careful bimanual examination and by the probe.

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## CHAPTER XLVII.

### TREATMENT OF RETROVERSION AND RETROFLEXION.

THE objects of treatment are replacement and retention of the uterus.

#### Treatment Preparatory to Replacement.

The writer desires to emphasize the great importance of local massage in the treatment of displacements; its practical value is, perhaps, greater than that of any other resource. The range of its usefulness extends, however, beyond the treatment of displacements; for this reason a special chapter has been given to its description.

#### Obstacles to Replacement.

The obstacles to replacement are inflammation, fixation of the uterus, and tumors. The inflammatory complications often require weeks, and in severe cases months, of treatment preparatory to replacement, and not uncommonly a tumor must be removed by a surgical operation. Some of the general therapeutic suggestions under the subject



of descent are also applicable to the retropositions. Rest, massage, careful regulation of the bowels, forced feeding, and general tonics are often essential. For the inflammation small blisters over the inguinal regions frequently repeated, and the daily application of cotton, the glycerin-plug to the cervix, and dry cupping over the sacrum, are common routine measures of some value. The most useful and essential topical application is the hot-water vaginal douche, but its use will be followed by failure and disappointment if it be applied in the ordinary way. The proper manner of giving the douche is described on page 80.

FIGURE 354.



Commencing reposition of the retroverted or retroflexed uterus by conjoined manipulation (modified from Schultze).

As the tenderness disappears the cotton plugs may be increased in quantity, and thereby made to serve as temporary support for the uterus until the more permanent pessary can possibly be substituted. The sluggish circulation in the pelvis and torpid condition of the bowels may be much relieved by the daily application of the hot hip-pack; it is applied as follows :

A small flannel sheet, folded lengthwise to the width of two feet, dipped in very hot water and dried by passing it through a wringer, is wound about the hips and covered by another dry one. At the end of half an hour, during which time the patient maintains the recumbent

position, the sheets are removed. A hot-water bag between the wet and dry sheets will serve to prolong the heat.

When the tenderness has been sufficiently reduced, gentle attempts at replacement may be made every day or two by conjoined manipulation. The patient's tolerance of manipulation may thus be observed and the way prepared for complete replacement and permanent retention after the subsidence of the inflammation. See Chapter L.

The above obstacles, especially fixation and tenderness, until removed by appropriate treatment, are contraindications to replacement.

#### Methods of Replacement.

The safest and most effective method of replacement is by conjoined manipulation, as represented in Figures 354 and 355, and in the illus-

FIGURE 355.



Completed reposition of the retroverted or retroflexed uterus by conjoined manipulation (modified from Schultze).

trations of Chapter L. The dotted lines in the former figure indicate the gradual elevation of the corpus out of the hollow of the sacrum to the pelvic brim, where it may be anteverted by the fingers of the right hand pressed well down behind its posterior wall. During the process of anteversion the index-finger of the left hand in the anterior fornix of the vagina presses the cervix back to its place in the hollow of the sacrum, as in Figure 355. Efficient reposition of the uterus is

very often impossible without anæsthesia. This is specially true when the corpus is wedged in and incarcerated between the utero-sacral ligaments under the sacral promontory, a condition often mistaken for displacement with adhesions.

The replacement is not usually accomplished by drawing the fundus directly forward and pushing the cervix back directly in the median line, but in most cases by sweeping the fundus around the arc of a circle on the left side of the pelvis and the cervix on the right. This is owing to the greater frequency of infection on the left side, and consequent shortening of the left broad ligament. After replacement the organ is to be held in position by appropriate means.

Bimanual replacement has three great advantages over the more familiar methods of the sound or repositor: first, it is more effective and more permanent; second, the lever action of the sound or repositor, by which the operator may unwittingly use an undue and dangerous amount of force, is avoided in the use of the hands; third, the operation is not only constantly under the operator's control, but also within his appreciation.

Instrumental uterine reposition by means of the sound or other instruments which enter the endometrium, and act by leverage, is unnecessary, dangerous, and therefore usually disapproved.

#### Means to Retain the Replaced Uterus.

The uterus having been replaced will seldom retain its normal position without artificial support. This support, according to the requirements of a given case, will be secured by means of

Pessaries.

Surgical operations.

#### RETENTION BY PESSARIES.

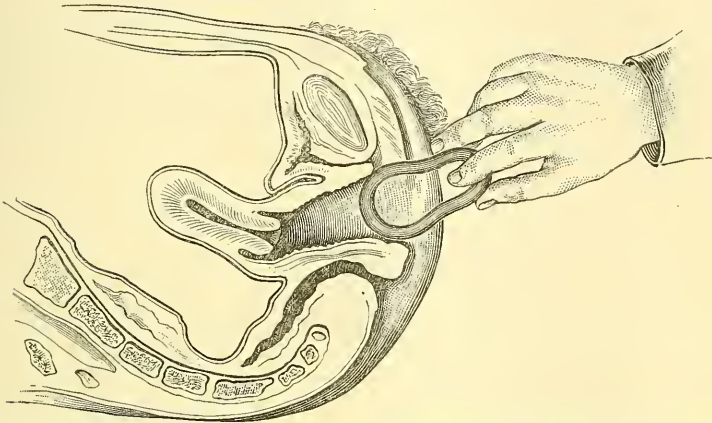
**Contraindications and Indications for the Pessary.** The enthusiast in mechanical gynecology would do well to consider the following: In the majority of cases of retrodisplacement the essential factor is inflammation. The resultant tenderness may render mechanical support intolerable. Adhesions and cicatricial bands may prevent or prohibit replacement, and therefore contraindicate the use of any means designed to hold the organ in place. A tumor or excessive weight of the uterus may carry the corpus backward and downward with a force greater than any pessary can counteract. The pelvic floor, including the fascial and ligamentous supports of the pelvic organs, may, from subinvolution or other cause, be so relaxed that no pessary can hold the organs in place.

It follows from the above that the field for the use of the pessary must be restricted to those cases in which the displaced organs are replaceable, in which the pessary is capable of holding them in place, and can be worn without discomfort. Failure to recognize and appreciate the contraindication accounts not only for the failures and disappointments, but also for the many evil results which have followed the



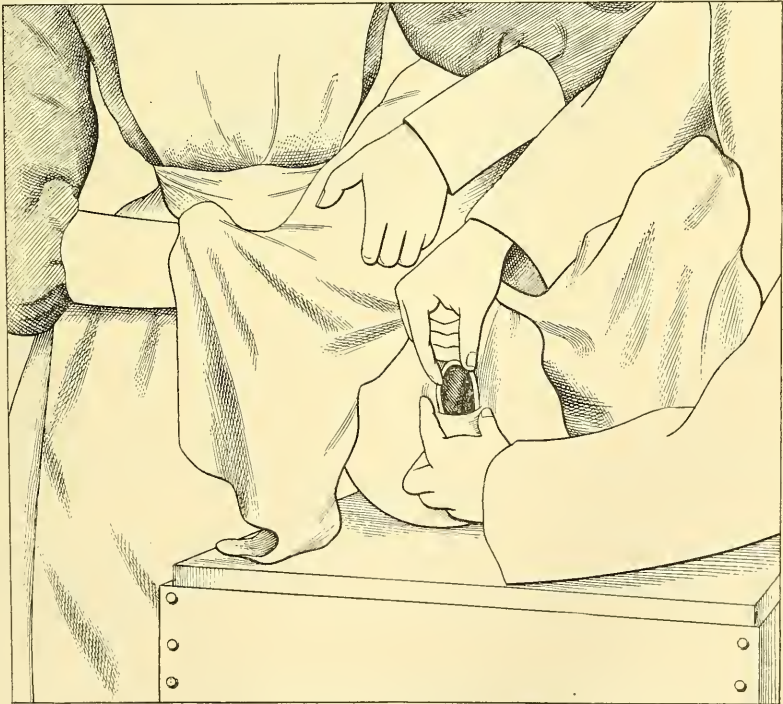
indiscriminate attempts to treat all displacements by mechanical support. The exclusion of unsuitable cases and the recognition of the necessity

FIGURE 356.



The common but faulty mode of introducing a pessary, with its breadth turned in the antero-posterior diameter of the vulva. The breadth of the instrument should be in the transverse direction, as shown in Figure 357.<sup>1</sup>

FIGURE 357.



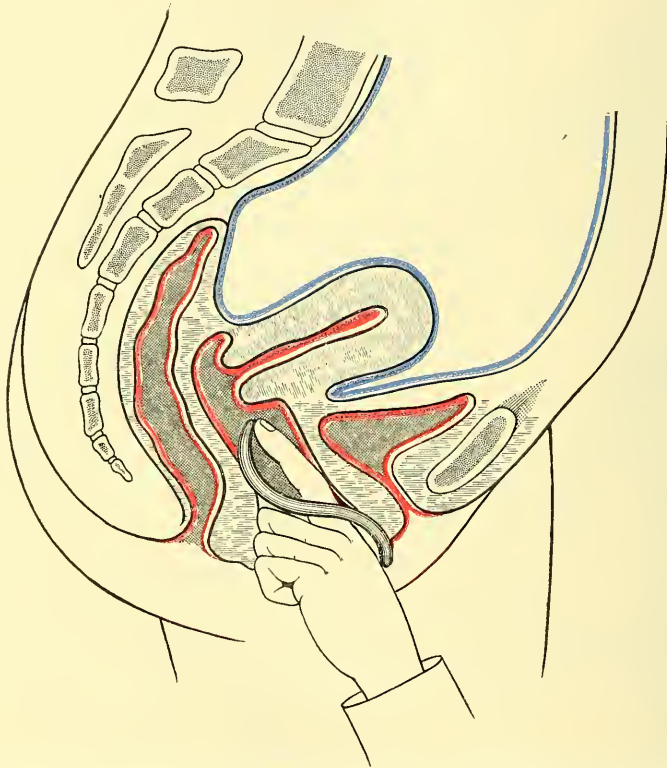
The correct mode of introducing a pessary.

<sup>1</sup> From Hart and Barbour. Manual of Gynecology.

for accurate diagnosis are apparent. The pessary, according to the knowledge, judgment, and mechanical skill of the practitioner, will be useful, useless, or injurious.

The Adjustment of the Pessary. Figure 356 shows a common but faulty manner of introducing the pessary. The vagina is a collapsed tube, the anterior walls of which rest on the posterior; hence, the long diameter of a cross-section of the canal is from side to side, not antero-posterior. The pessary should, therefore, be introduced with its lateral edges to the sides of the vulva.

FIGURE 358.



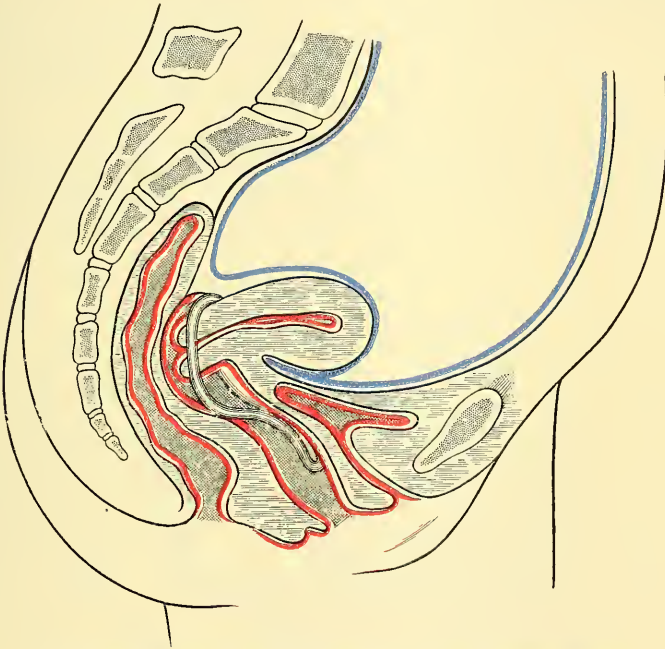
The upper end of an Albert Smith pessary being pushed into place back of the cervix. The apparent lack of mobility at the normal angle of flexure in this uterus is a not uncommon result of the metritis which often complicates retroversion and retroflexion.

If introduced as shown in Figure 356, with its lateral edges in the antero-posterior direction of the vulva, the pessary is apt to press painfully against the urethra in front and the perineum behind. This pain is increased when the instrument is turned to conform to the vagina, as it must be before it can take its proper place.

In the correct mode of introduction the labia are separated by the thumb and index-finger of the left hand, and the pessary is pushed in with the right hand, its lateral edges being to the side of the vulva;

it then readily follows the curves of the vaginal outlet. This mode of introduction requires less force and gives less discomfort. The first step toward adjustment is complete when the inner end of the pessary is in contact with the anterior wall of the cervix uteri. The second step is to pass the left index-finger, the palmar surface being in contact with the perineum, under the pessary, and push the upper end under the cervix and then backward into its place in the post-vaginal fornix. See Figures 357, 358, and 359.

FIGURE 359.



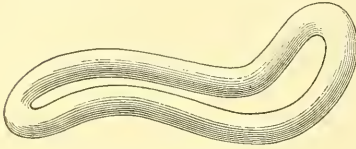
Albert Smith pessary in place and uterus maintained in normal position.

The curves of the pessary demand careful attention in its application. When the uterus is below the normal level the broad ligaments are necessarily rendered more tense than natural, and the bloodvessels, more especially the veins, which are looped one upon the other, and which traverse these ligaments to and from the uterus, are made to collapse. This causes venous congestion and consequent increase in weight of the uterus—a condition favorable to malposition, uterine catarrh, and pathological changes in structure. A pessary which will raise the uterus to the health level clearly fulfils an indication. A pessary which raises it above the health level renders the broad ligaments tense and reproduces a condition which it was designed to relieve. Maintenance of the uterus upon the health level depends largely upon the curves of the pessary. The accompanying cuts illustrate the shape and curve of the Hodge pessary as modified by Emmet and Albert Smith. Figure 360 represents the curve of Emmet, and Figure 361



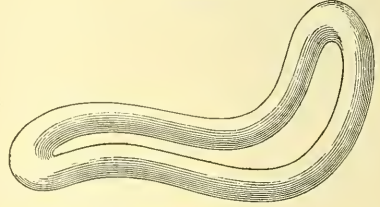
that of Albert Smith. For convenience, let us characterize that curve which rests in the posterior vaginal cul-de-sac as the uterine curve, and that which occupies that part of the vagina adjacent to the pubis the

FIGURE 360.



The Emmet curves.

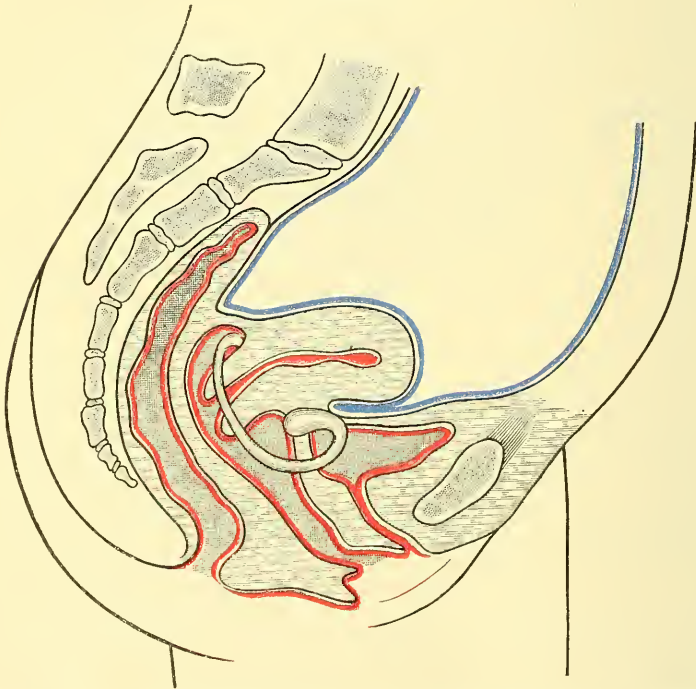
FIGURE 361.



The Albert Smith curves.

pubic curve. The acuteness and length of the uterine curve determine the height to which the pessary will lift the uterus. The longer and more acute the curve, the higher the uterus will be lifted, and *vice versa*.

FIGURE 362.



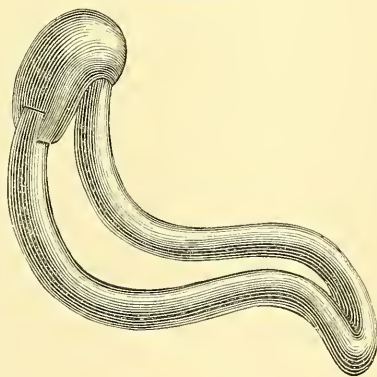
Schultze's sleigh pessary in position. This pessary is not in general use, but is serviceable to hold up the vesico-vaginal wall in cases of cystocele and rectocele.

The smaller curve of the Emmet modification will answer the average indication more nearly than the sharper curve of the Albert Smith modification, which may lift the uterus too high. The pubic should

generally be proportioned to the uterine curve—that is, the greater the uterine, the greater the pubic curve. A pessary properly adjusted in all other respects may, by pressure upon the urethra and neck of the bladder, create vesical tenesmus and urethral irritation. This calls for increase in the pubic curve—that is, the pessary should be bent away from the irritated part. The pubic curve may, however, be so great that the lower part of the pessary occupies the centre of the vulva, where it may create irritation. For this condition lessening of the pubic curve is the remedy. The pessary should not be so wide as to distend the vagina. Its length should be measured by the distance from the lower extremity of the symphysis pubis to the posterior vaginal cul-de-sac, less the thickness of the finger. If properly adjusted in a suitable case it should sustain the pelvic floor in its normal relations and the uterus in stable equilibrium.

Thomas's retroflexion pessary, with its bulbous upper extremity, is a long narrow instrument of extreme uterine curve. It lifts the uterus very high, and is specially applicable in cases of great relaxation of the pelvic floor and of complicating prolapse of the ovaries; the bulbous portion is sometimes made of soft rubber.

FIGURE 363.



Thomas's retroflexion pessary.

The Function of the Pessary is to maintain the uterus not only on the health level in its normal location, but also, if possible, in its normal position, which requires the cervix to be about one inch from the sacrum. The cervix in a suitable case being thus properly placed, retroversion is not liable to occur, because in so doing the fundus uteri would encounter the sacrum, and because the direction of least resistance would be forward into the normal anterior position.

It follows that the application of the pessary is based upon the general proposition that *if the cervix be normally placed the body of the uterus will, in the absence of complications, take care of itself.* Since the vagina at its upper extremity is attached to the cervix, displacement of the latter is clearly impossible if the upper extremity of the vagina be sustained in its normal location. The pessary restores and maintains the relations of the relaxed vaginal walls by crowding the posterior

vaginal cul-de-sac backward into the hollow of the sacrum. It also holds the attached cervix within a proper distance from the sacrum, and thereby fulfils its indication by sustaining the pelvic floor. The Hodge pessary, or some modification thereof, answers this purpose in ordinary cases more satisfactorily than any other.

The same general principles—in fact, the same pessaries—which are applicable to prolapse apply also to retroversion and retroflexion. Indeed, the first step in the genesis of the retro-malpositions has been shown to be prolapse. The student is referred to the general remarks on the adjustment of pessaries for prolapse, page 533.

Pessaries designed to prop up the body of the uterus by pressure upon the posterior wall for the correction of the posterior malpositions, and upon the anterior wall to correct the anterior malpositions, are not only unnecessary, but are very liable to induce metritis and perimetritis, and are therefore generally disapproved. In certain cases, however, the vaginal walls, especially the posterior, may be so relaxed from subinvolution and other causes that the instrument, though very long, fails to maintain the cervix in its normal place. Under such conditions an instrument may be required to act directly upon the uterus. The Schultze's sleigh pessary, represented in Figure 362, fulfils this indication. A long Albert Smith pessary, with its uterine curve made so extreme as to bring the upper part of the instrument in front of the cervix, instead of behind, may answer the same purpose. Expedients of this kind, however, are always of doubtful value.

In retroversion and retroflexion always replace the uterus before adjusting the pessary, otherwise the instrument will press upon the sensitive uterus, and one of three unfortunate results may occur: (*a*) the pessary may not be tolerated on account of pain; (*b*) it may be forced down by pressure from above so near to the vulva that it will fail to do the least good; (*c*) the uterus, finding it impossible to hold its position against the pessary, instead of taking its proper position, may be bent over it in exaggerated retroflexion, with the cervix between the pessary and the pubes, or the whole organ may slip off to one side of the instrument into a malposition more serious than the one for which relief is sought.

A properly adjusted pessary gives to the patient no consciousness of its presence. If the instrument cause pain it should be removed and search made for the tender places; it should then, if possible, be remoulded into such shape that it will not make pressure upon them. Often a slight indentation at some point will enable the patient to wear it with comfort. If it cannot be made comfortable it should be abandoned.

Sometimes when the corpus has been firmly bound back by peritoneal adhesions they may be broken up by very forcible conjoined manipulation under ether; but the operation is dangerous, and should therefore be undertaken only by an expert operator, if at all. The gradual method of local massage, as described in Chapter L., will ordinarily take the place of such forcible replacement.

In certain cases in which replacement is impracticable or impossible, on account of inflammation or adhesions, a soft rubber ring may be



inserted, and will sometimes give decided relief by lifting the uterus and pelvic floor nearer to the health level. In the treatment of all displacements coition should be forbidden until the inflammatory signs have disappeared. The pessary should be kept clean by moderate daily applications of the vaginal douche. Every three or four weeks the instrument should be removed and the pelvic organs carefully examined.

No man can safely apply the pessary until he has fully appreciated its indications and contraindications. Many practitioners are deficient in the natural mechanical skill necessary to its proper adjustment. Of this thousands of unfortunate women bear witness. Its dangers in inefficient hands are in striking contrast with its usefulness when judiciously employed in proper cases.

#### RETENTION BY SURGICAL OPERATIONS.

Many cases of displacement, both anterior and posterior, are so complicated by prolapsed and adherent ovaries, by advanced disease of the ovaries and Fallopian tubes, by tumors, by inflammatory exudates, or by peritoneal adhesions, that replacement is impossible, or, replacement being possible, the pessary is either intolerable from pain or it fails to sustain the uterus, and is therefore inadequate. Such cases, unless relievable by local massage or the topical treatment already outlined, furnish a definite indication for surgical treatment.

*Perineorrhaphy, elytrorrhaphy, and the removal of tumors* have already been considered under their respective heads. Whenever the perineum has been displaced downward and backward away from the pubes toward the coccyx, its replacement by perineorrhaphy or by some suitable plastic operation upon the vaginal outlet is always indicated; see Chapters XL. and XLI. Elytrorrhaphy is not usually indicated unless the retro-malposition is associated with descent to the second or third degree. If the malposition is caused by a tumor the pathology, diagnosis, prognosis, and treatment will be those of the tumor.

The surgical treatment proper of the posterior malpositions involves a description and comparison of three recognized operations. Each has its special adaptation under their respective heads. In the treatment of some cases, according to the individual preference of the surgeon, either one of the three is permissible. The operations are:

1. Alexander's operation, shortening the round ligaments.<sup>1</sup>
2. Abdominal hysterorrhaphy.
3. Vaginal hysterorrhaphy.

#### ALEXANDER'S OPERATION.

The round ligaments, as already explained, restrain the uterus from excessive backward movement. They are two cords the size of goose-quills, each springing from the horns of the uterus just below and in front of the origin of the Fallopian tube. They pass forward on either side in the folds of the broad ligaments through the internal inguinal

<sup>1</sup> A very full paper on this subject is one by Dr. George M. Edebohs, in the American Gynecological and Obstetrical Journal, December, 1896. This paper contains an exhaustive bibliography.

rings, through the inguinal canals and the external rings, and, spreading out in strands, are lost in the mons veneris and upper parts of the labia majora. These ligaments consist of unstriped muscular fibres in condensed areolar tissue. Physiologically they have some contractile power.

When the uterus is retroposed the round ligaments are necessarily stretched out to such an extent that they can no longer exert their normal restraining power upon the backward movements of the organ; hence the proposition to shorten them to such an extent that they will resume their normal functions. This is Alexander's operation.

#### Indications and Contraindications for Alexander's Operation.

The operation is permissible only when the displacement is not complicated by a tumor, inflammation of the uterine appendages, adhesions, or other impediments to replacement. Clearly, shortening the ligaments could not hold in place a uterus firmly bound down by adhesions or weighted down by a tumor. True, as some advise, the peritoneal cavity might be opened and the adhesions broken up or the tumor removed, as preliminary measures to the shortening of the ligaments, but under such conditions most surgeons would prefer hysterorrhaphy as being the more rational and effective operation. If the uterus can be retained in place by a pessary, or can be successfully treated by massage or any of the other non-operative means already described, Alexander's operation, though not a procedure of necessity, may yet be one of expediency. The expediency will, however, depend upon the woman's ability and willingness to carry out the more conservative course. Temporizing measures may insure comfort only so long as she can be free from care, anxiety, and overwork. If she must earn her own living, a radical cure by surgical measures may be necessary. After anæsthesia, before the operation is begun, a thorough conjoined examination should always be made in order especially to exclude inflammation of the uterine appendages. The operation, if made in the presence of unsuspected suppuration in the tube or ovary, may lead to fatal peritonitis.

#### Preparatory Treatment.

The preparatory treatment is the same as that already laid down in Chapter II., for abdominal and vaginal section. Endometritis is almost always present in the retroposed uterus; hence, dilatation and curettage are indicated, and should be performed immediately before the shortening of the ligaments; the reason for this is twofold: first, to cure the endometritis; second, to render the endometrium aseptic, and thereby shut off post-operative infection from that source. Necessary plastic operations on the cervix uteri, vagina, and perineum may, according to the strength of the patient and the rapidity and dexterity of the operator, be made at the same time. If the perineum is injured its repair is essential to success.

### Steps of the Operation.

The steps of the operation are : 1. To find and isolate the ligaments. 2. To draw them out until their superabundant slack has been taken up. 3. To anchor or fix the drawn-out portions by means of suture, in order to prevent them from slipping back through the internal ring into the pelvic cavity. The location and extent of the incision and the mode of isolation of the ligament vary with different operators; for example, an incision direct to the external ring was first practised by Alexander.<sup>1</sup> It is, however, often difficult to find the ligaments at this point. J. Frank and Newman<sup>2</sup> cut directly to the internal ring. Kellogg opens the inguinal canal by a small incision near the internal ring. Edebohls opens the canal throughout its entire length. The method of Kellogg, with minor modifications, is the one adopted by the writer, and is as follows.<sup>3</sup>

### Anatomical Landmarks.

The anatomical landmarks are the anterior superior spine of the crest of the ilium, the spine of the pubes, and Poupart's ligament. The deeper landmarks on either side are the internal inguinal ring, which lies just above the spine of the pubes; the external ring, about three inches above, in the direction of the anterior superior spine of the ilium, and the inguinal canal. The canal lies between the internal and external rings—that is, the rings form the ends of the canal.

### The Incision.

The incision through the skin is made midway between the internal and external rings, one inch or more long, parallel to and just above Poupart's ligament; this is directly over the middle third of the roof of the canal. A clean and careful dissection is now made to the tendon of the external oblique muscle. It is important that the natural color and appearance of the cut surfaces be preserved, in order that the exact point of incision into the canal may be readily recognized; hence the necessity of clean dissection and the immediate control of all bleeding points by snap-forceps.

The glistening tendon of the external oblique now exposed will usually show a dark line. This line marks a point where the fibres of the tendon begin to separate to form the columns of the external ring. The borders of the separated tendon are connected by the intercolumnar fascia, which, being thinner than the tendon, enables one to see through it to the darker tissues beneath. There may be several narrow points of separation or one broad one. In exceptional cases the separation is absent up to the very border of the external ring. When the dark line has been found, pass the finger down the line toward the pelvic spine and see that it opens into the external ring. This locates the

<sup>1</sup> Alexander. London: Churchill, 1884. Hart and Barbour.

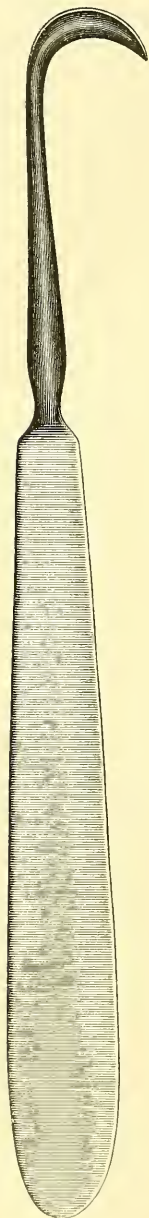
<sup>2</sup> American Journal of Obstetrics, 1885.

<sup>3</sup> The description here given is in the main an extract from the paper of Kellogg, reprint from the Proceedings of the Michigan State Medical Society, 1889.



canal. The wound is now drawn widely open by two retractors in the hands of an assistant. The opening in the tissues overlying the tendon thus widely separated may be slid about over a considerable

FIGURE 364.



Two of these retractors are needed for opening the wound.

FIGURE 365.



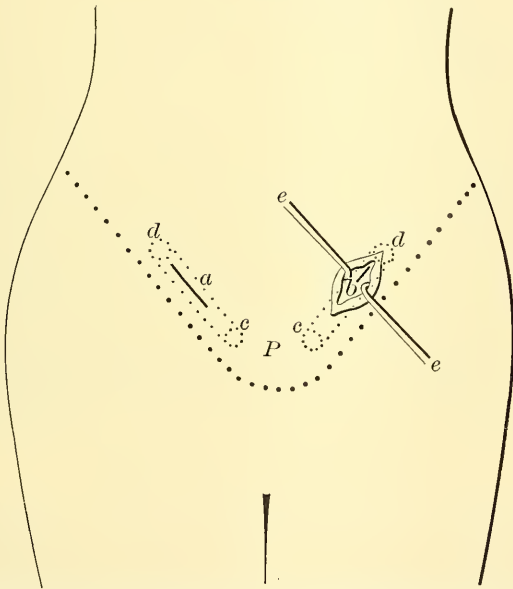
Two of these hooks for picking up the round ligament.

area until just the right point for opening the canal is found; it is about three-quarters of an inch below the internal ring. At this point a puncture or an incision, not more than a third of an inch long, is made by a small scalpel.

#### Finding the Ligaments.

To find the ligament take two small hooks, page 558, one in each hand. The small opening is made to gape with the hook in the left hand, while the other is passed by the right hand into the opening and directly backward, the flat side of the hook parallel to Poupart's ligament and hugging it closely. When the hook has penetrated to a depth of about one inch, its point is turned toward the canal, and the tissues that come in its way are hooked by a wide sweep and drawn up

FIGURE 366.



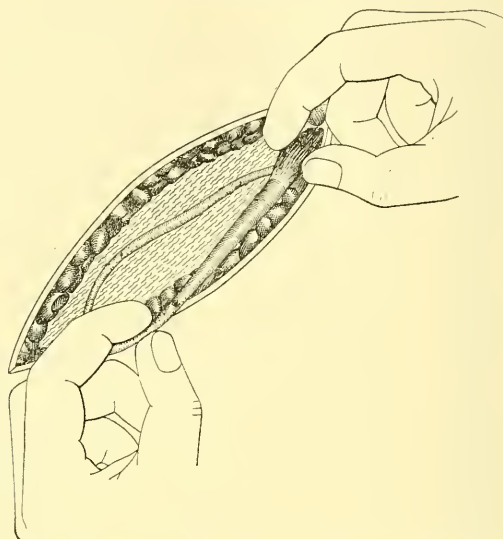
*a*, the internal ring; *e*, external ring; dotted lines between indicate the position of the inguinal canal, the dotted lines below indicating direction of Poupart's ligament. *a* shows position of skin incision; *e, e* indicate retractors by which the tissues divided by the incision are separated down to the tendon of the external oblique; *b* shows the small incision in the tendon of the external oblique near internal ring; *P*, pubes.<sup>1</sup>

through the slit in the roof of the canal. The little mass of tissue thus brought up will often contain the ligament, but more frequently it is just below the hook and closely connected with the tissue engaged by the hook. A dip with the other hook will bring up the ligament itself. The tissue thus brought into view is a grayish-colored mass of fat which contains anastomosing bloodvessels and the ligament, with its accompanying ilio-inguinal nerve and vessels.

<sup>1</sup> Modified from Kellogg. Proceedings Michigan State Medical Society, 1889.

The operator who attempts to find the ligament as Alexander directed, by cutting down through the mass of fat, will find himself embarrassed by the resultant bleeding and the disarrangement of the contents of the canal. He may for hours grope blindly about the region among

FIGURE 367.



Drawing out round ligament and stripping back investing peritoneum from the broad ligament.<sup>1</sup>

a variety of structures which marvellously resemble, but are not, the ligament.<sup>2</sup> The earlier operators who cut directly to the external ring, where the ligament spreads out just before passing, fan-shaped, to the pubes and labia, were frequently misled, and therefore often unsuccessful.

#### Drawing Out the Ligaments.

The mass, having been picked up by the hook, is now spread out on the finger, and the ligament invested in its fascial sheaths is recognized by its cord-like appearance. On making a longitudinal slit in the sheath, the smooth, glistening pink surface of the round ligament appears. From this time the operation on that side is simple. As soon as the identity of the ligament is clearly established by the fact that it can be "readily pulled out from the direction of the inguinal ring—that is, made to run," it is secured from slipping back into the canal by passing a ligature loosely around it and covering the wound with protective gauze, while the ligament on the opposite side is found and exposed in the same manner.

When the ligament is separated from its surroundings it will usually run freely, and this, aside from the eye, is the best test of its identity. Even the eye may be deceived, for in this region are several structures

<sup>1</sup> Suggested by Edebohls.

<sup>2</sup> Laphorn Smith. *The Medical News*, September 29, 1896.



which closely resemble the ligament. If the ligament is not readily found by the hooks, as above described, they should be again and, if necessary, again introduced. Oftentimes it will be found outside of its sheath crowded down close to Poupart's ligament at the very bottom of the canal, or it may be at the opposite side of the canal. Give the hook a broad sweep so as to engage the entire contents of the canal. If necessary, the incision may be prolonged to the internal ring, or another short incision may be made into the canal at the internal ring, after the method of Frank and Newman, and the ligaments sought there. A little patience and care will usually lead to success. Failure to find the ligament is attributed not to its absence, but to faulty technique.

The ligament, once found and isolated, will usually run freely. It should be drawn out by gentle, steady traction until it begins to increase rapidly in size and to present a sort of shoulder. This indicates that a point near the horn of the uterus has been reached. At this point it is surrounded by a fold of peritoneum, the canal of Nuck, which is dragged through the internal ring into the inguinal canal. It is well to free both ligaments before pulling them out to the necessary extent. In some cases they are quite small, and therefore, if strongly pulled, are liable to break and retreat into the internal ring beyond reach. By careful and repeated trials, however, it will usually, as it is gently drawn out, become larger and appear as a smooth, glistening cord.

The extent to which the ligaments should be pulled out is a matter for judgment; in each case sufficient slack should be taken up to secure the corpus uteri in its normal anterior position. The rapid enlargement of the ligament and the appearance of the canal of Nuck indicate a safe limit.

In separating the ligament and drawing it out great care should be taken not to injure or include the ileo-inguinal nerve. Division of this nerve has repeatedly caused anæsthesia of the inguinal region.<sup>1</sup>

#### Anchoring the Ligaments.

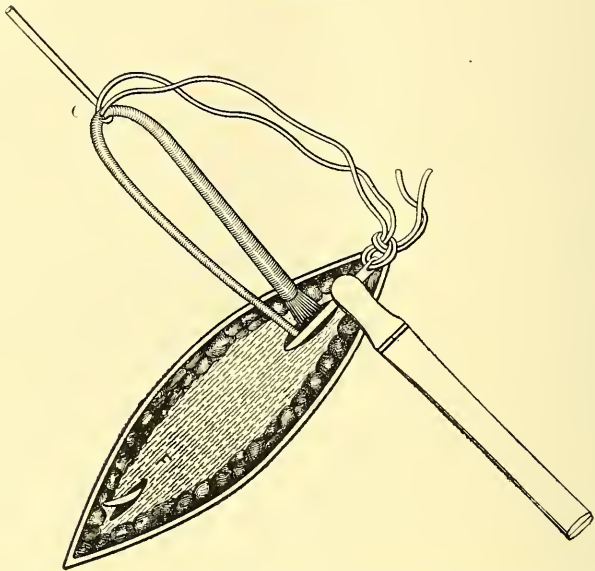
The ligament having been drawn out to the required extent, as shown in Figure 367, the end of its loop at *C*, Figure 368, is transixed and tied with a ligature. The ends of the ligature are left long, and together threaded into a blunt needle. The needle is then passed under the tendon of the external oblique muscle and emerges at *F*, where a short slit has previously been made into the inguinal canal, and through which the loop of round ligament is now drawn. The original slit through which the ligament was first drawn out of the inguinal canal is closed with fine catgut sutures and the remaining external portion of the loop is folded down on the tendon of the external oblique muscle and stitched there in the manner shown by Figure 370.

The two ligatures are then used as continuous buried sutures for the secure anchoring of the ligament and the closure of the wound. The wound closure is similar to that laid down on page 111 for closure of

<sup>1</sup> Edebohls. American Gynecological and Obstetrical Journal, December, 1896.

the abdominal wound. Formaldehyde catgut is used for ligatures and sutures throughout the operation. See page 40.

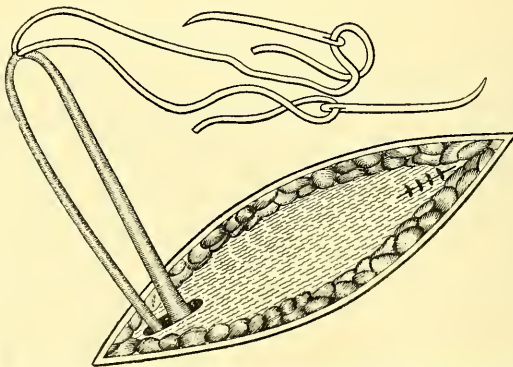
FIGURE 368.



The ligament drawn out to the required extent. Ligature passed through the ligament at the loop. Loop being drawn under the tendon of the external oblique to emerge at the opposite end of the wound.

It is a safe, though usually unnecessary, precaution during the first month after the operation—that is, until strong healing is secured—to

FIGURE 369.



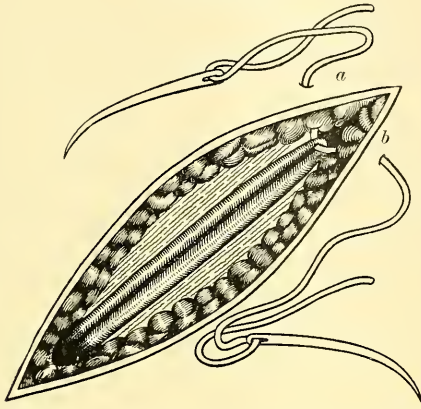
Loop drawn out at pubic end of wound. Original opening into inguinal canal closed with sutures. Two shorter needles now take the place of the single long blunt needle.

guard against a recurrence of the displacement by means of a pessary. The after-treatment is the same as for abdominal section.

The operation for shortening the round ligaments by folding them

on themselves and stitching them together inside of the abdomen has been proposed and successfully practised in many cases by Palmer Dudley, of New York, and Mann, of Buffalo. This operation is pre-

FIGURE 370.



Loop of the ligament folded down on the tendon of the external oblique muscle, and the two free ends of the ligature passed through at *a* and *b*, to be tied for the closure of the wound.

ferred to that of Alexander when, for any reason, it becomes necessary to open the abdomen. The advantage of Alexander's operation is that it does not require abdominal section. If the abdomen is to be opened, the writer would prefer the more certain method of hysterorrhaphy.

#### ABDOMINAL HYSTERORRHAPHY.

The object of the operation is to replace the uterus and secure it in its normal position by means of sutures so placed as to unite it with the anterior abdominal wall.

#### Nomenclature.

Hysterorrhaphy has been known under various names, some of them more or less descriptive of special methods of operation. They are: Ventral fixation, abdominal fixation, suspensio uteri, and hysteropexy.

#### Impediments to Replacement.

The incision having been made the left index-finger is introduced into the pelvis and a thorough study made of all the intrapelvic organs. Before the uterus can be replaced adhesions may have to be broken up.

Tumors of the uterus or its appendages may have to be removed. Conservative or radical operations upon the Fallopian tubes or ovaries may be imperative.

Posterior displacements of the uterus are often associated with salpingitis, ovaritis, and adhesions which would render mechanical treatment by a pessary or shortening of the round ligaments useless or dangerous. The occasional failure to recognize these extra-uterine

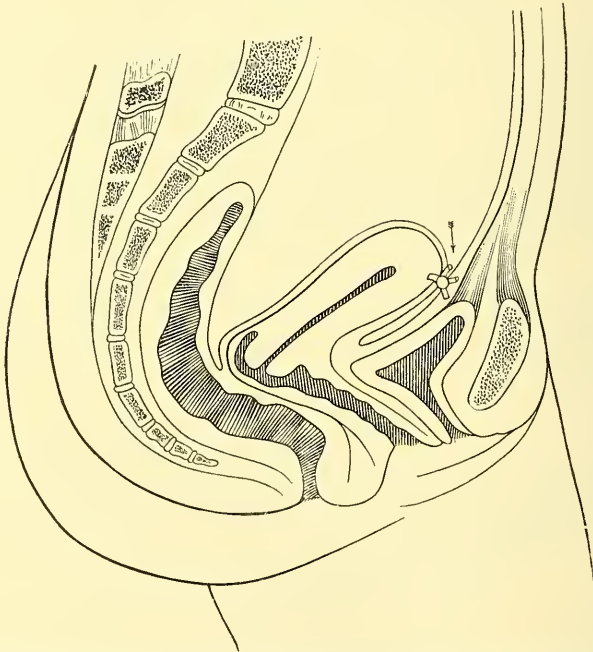


complications accounts for some disastrous results which have followed mechanical treatment and Alexander's operation. The great advantage of hysterorrhaphy is that the peritoneal cavity is open to direct examination and complete diagnosis. The surgeon, therefore, as he proceeds, may avoid unsuspected sources of failure or danger. The very contraindications for Alexander's operation become the indications for hysterorrhaphy. The impediments to replacement and fixation having been overcome or removed, the operation proper—that is, fixation—may be undertaken.

#### The Conditions of Success.

The sutures should be placed slightly posterior to a line connecting the two horns of the uterus—that is, in the posterior wall. The earlier operators stitched the anterior wall of the corpus to the abdominal wall. By this arrangement the uterus is so placed that contraction of the

FIGURE 371.



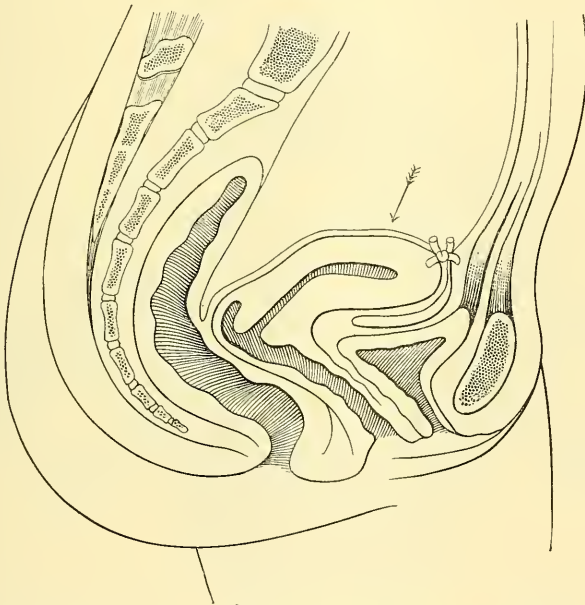
Suture wrongly placed in the anterior wall of the corpus. The arrow points in the direction of the forces which fall on the anterior uterine wall and tend to force the organ back and thereby to reproduce the displacement.

abdominal muscles and the intra-abdominal forces must be exerted against the front of the uterus, and must therefore, by forcing the uterus back, ultimately stretch or break the adhesions and reproduce the displacement. If, on the contrary, the posterior wall of the corpus be properly stitched to the anterior abdominal wall, all the forces from

above are exerted on the posterior wall of the corpus, and thereby tend to perpetuate the normal anterior position.<sup>1</sup>

Another condition of success is to limit the adhesions between the uterus and abdominal wall. When the adhesion is to the posterior wall of the corpus uteri, it is surprising how slight it may be and yet make a permanently good result. The object of the operation is not to fix the uterus immovably to the abdominal wall by broad areas of adhesion; such a result is sometimes produced by numerous deep sutures and extensive scarifications of the anterior or posterior face of the uterus. The broad, unyielding adhesions thus obtained must interfere with the normal movements of the uterus, and thereby give rise to a condition more distressing than the displacement.

FIGURE 372.



Posterior wall of the corpus properly stitched to the anterior abdominal wall. The arrow shows the direction of forces from above so exerted as to fall on the posterior uterine wall and thereby perpetuate the normal anterior position.

Occasional cases of dystocia, some of them demanding craniotomy or even Cæsarean section, bear witness to the danger of excessive uterine adhesions to the abdominal wall. After the operation the adhesions, if properly made, do not remain as such, but stretch out so far as to form a short, ribbon-like band between the uterus and the abdominal wall. This band contains connective tissue and possibly some fibres from the recti and uterine muscles, and is covered by peritoneum; it is therefore a new suspensory ligament designed to supplement the inadequate uterine ligaments. This ligament has been demonstrated by

<sup>1</sup> The necessity for uniting the posterior wall of the corpus uteri, instead of the anterior wall, to the parietal peritoneum of the abdominal wall, was first pointed out by Dr. Howard Kelly.

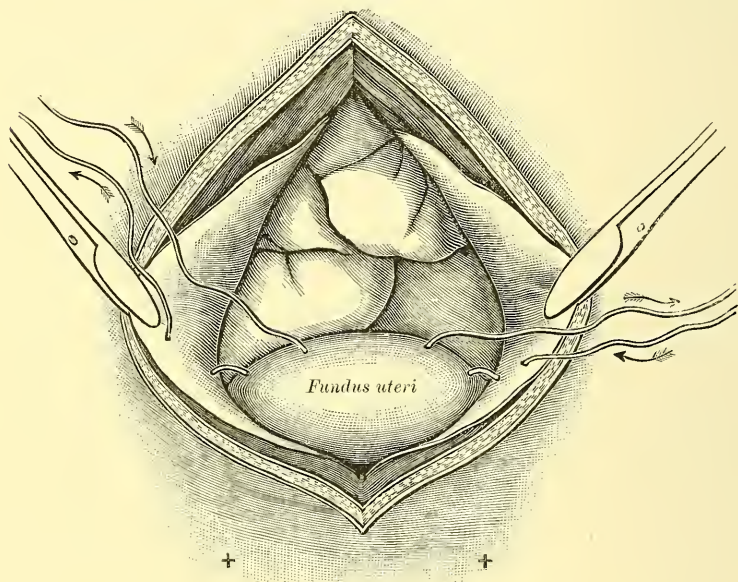
dissection years after the operation.<sup>1</sup> It is usually, when fully stretched out, about two inches long. This elongation of the adherent structures into a new uterine ligament cannot occur if the adhesions are too extensive and too strong.

#### Technique.

The incision, general conduct of the operation, closure of the wound, and after-treatment are the same as for any other abdominal section. See Chapters VI., VII., and VIII.

The introduction of the hysterorrhaphy sutures, according to the individuality of the operator, varies in minor details. The writer uses two formaldehyde catgut sutures, one on each side of the posterior wall of the corpus uteri.

FIGURE 373.



Peritoneal margins of the wound everted to the outside by snap forceps. Corpus uteri held steady by a vulsellum forceps, not here shown. Sutures on both sides passed but not tied.

An abdominal incision from one to two inches long is made in the median line just above the pubes. The margins of the peritoneum are drawn through the wound over the cutaneous margins, and are held outside by hæmostatic forceps, as shown in Figure 373. The corpus uteri is lifted forward by the left index-finger and middle-finger introduced through the wound, and is held in place by light vulsellum forceps in the hand of an assistant.

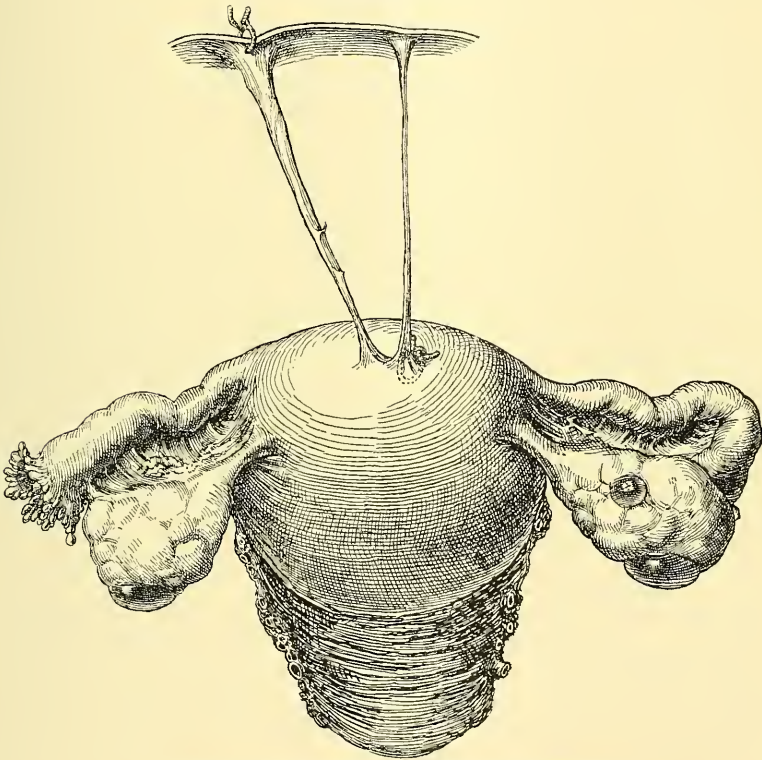
The teeth of the forceps grasp the posterior surface of the corpus in the median line about one-half inch back of the summit of the fundus. The operator, standing on the patient's right, passes a short needle,

<sup>1</sup> Penrose: Diseases of Women.



slightly curved at the point and threaded with fine formaldehyde cat-gut, into the everted peritoneum on the left side. The needle enters just above the lower angle of the wound, about three-quarters of an inch from its peritoneal margin; it dips down about one-quarter of an inch so as to include some fibres of the rectus muscle, and emerges about one-half inch from the point of entrance. The needle is then reintroduced into the posterior wall of the corpus to one side of the median line near the horn of the uterus. Care should be taken not to puncture the Fallopian tube. The uterine part of the suture should

FIGURE 374.



Adhesions stretched out to form new artificial ligaments.<sup>1</sup>

include sufficient peritoneal and subperitoneal tissue to give it a strong hold on the uterus. The free ends of this suture are now fastened together by snap forceps and laid to one side. Another similar suture is passed on the opposite side. It is convenient in passing this to do so in the reverse order—that is, to pick up the uterus first and the abdominal peritoneum second. Both sutures being thus passed, a final examination of the pelvic contents is made, and if all is well the sutures are tied. This secures the upper posterior wall of the corpus uteri to

<sup>1</sup> After Howard Kelly.

the anterior abdominal wall. The external wound is then closed by continuous catgut, as directed on page 40. There is no occasion for scarifying the peritoneal surfaces; indeed, this should not be done. Adequate adhesion will always form from the presence of the sutures. The pessary is not needed during convalescence.

Immediately after the operation, while the uterus is immovably fixed, there may be some bladder irritation; but in a few weeks, when the adherent structures have stretched out and formed a new suspensory ligament and the uterus has assumed its normal state of mobile equilibrium, the vesical irritation disappears.

#### VAGINAL HYSTERORRHAPHY.<sup>1</sup>

The purpose of this operation is to anchor the uterus in its normal anterior position by stitching the anterior wall of the uterus to the anterior wall of the vagina.

*Operation.* Vaginal section is made as directed on page 258. The patient is on the back, with the cervix uteri and anterior vaginal wall exposed by means of Simon's speculum and other retractors. The uterus is drawn downward and backward by means of vulsellum or bullet forceps. The anterior vaginal wall is put upon the stretch by means of a small vulsellum forceps fastened to the vagina in the median line midway between the meatus urinarius and the cervix uteri. A median longitudinal incision is then made in the anterior vaginal wall extending from the cervix uteri one inch or more toward the meatus. This incision, which divides the vaginal wall, but does not invade the bladder, is separated by retractors, the cervix is drawn more strongly forward, and the loose cellular tissue adjacent to the anterior wall of the cervix is stripped back by means of the finger or blunt instrument until the utero-vesical reflection of the peritoneum is reached. See Figures 170 and 171.

A sound in the bladder will distinguish the peritoneum from the bladder wall. The peritoneum, then exposed, is seized with the tenaculum or snap forceps, and divided with blunt scissors. The peritoneal opening is then enlarged by introducing the two index-fingers and tearing and stretching it laterally, or by careful cutting with the scissors. The large opening thus made between the uterus and the bladder will permit the bladder to be pushed up out of the way and the corpus uteri to be drawn through into the vagina and down to the vulva. If there are posterior or lateral adhesions which prevent this, they may be broken up by the finger introduced through this opening or through a similar one made for the purpose posterior to the uterus. See Posterior Vaginal Section, page 258. The uterus, being freed, is drawn into the vagina by successively grasping its anterior wall with two pairs of vulsellum forceps, one in each hand, using first one and then the other, until the fundus finally appears and with it the appendages. Any necessary operation on the uterus or its appendages may now be

<sup>1</sup> This operation has passed through numerous modifications, and is still in the transition stage. Among the names chiefly associated with the evolution are those of Schücking, Säger, Mackenrodt, Dührssen, Byford, and Vineberg.

performed; there may be a small myoma to be enucleated, or some conservative or radical operation to be performed on the uterine appendages. The uterus is now ready to be fastened to the anterior vaginal wall, as follows:

A needle such as would be used for closing the lacerated cervix is threaded with silkworm-gut, and with the needle forceps passed through the flap of the vaginal incision near the urethra, on the patient's left, then continued transversely through the anterior wall of the uterus near the fundus and brought out through the vaginal flap on the opposite side. Another similar suture is passed immediately below this. These uterine sutures are not tied until after closure of the vaginal incision. The vaginal incision is closed with a continuous buried catgut suture in a manner similar to that described on page 40, for closure of an abdominal wound. The vagina is lightly packed with aseptic gauze and an aseptic dressing is placed over the vulva. The dressings should be changed often enough to keep them clean. After three days the vaginal gauze may be left out, and in its place may be given a daily hot aseptic vaginal douche. The silkworm-gut sutures are removed at the end of four weeks. Formaldehyde or chromic catgut, if used in place of the silkworm-gut, need not be removed at all.<sup>1</sup>

Unless the adhesions between the uterus and the vagina be very broad and very strong, they are liable in a few weeks to give way, with complete return of the displacement. If, on the other hand, the adhesions are sufficiently strong and broad to make a permanent anatomic cure, and pregnancy follows, the danger from dystocia is very great. Numerous cases have been reported, some of them fatal, in which Cæsarean section or other grave obstetric operations became necessary for delivery. The operation therefore, as above described, is not approved for cases in which pregnancy may occur.

Vineberg<sup>2</sup> and others have undertaken to overcome the above-stated objections to vaginal fixation by stitching the slack of the round ligament and a portion of the broad ligament into the vaginal wound. This does not give rise to such broad, strong adhesions as are necessary for success in ordinary hysterorrhaphy. The immediate results appear to be good. Further observation will be necessary to determine the remote results, especially in their relations to pregnancy and parturition.

#### The Relative Merits of Abdominal Hysterorrhaphy and Alexander's Operation.

Shortening the round ligament is limited to those cases of slight descent, with retroversion or retroflexion, in which the uterus is replaceable, free from troublesome adhesions, and not complicated by tumors or diseased appendages. The indication is further restricted by the exclusion of cases which can be satisfactorily treated by mechanical support or other less radical measures. The field, therefore, for the operation is not very great.

<sup>1</sup> The method above described is similar to that advocated and successfully practised by Vineberg. *New York Medical Journal*, October 27, 1894.

<sup>2</sup> *American Journal of Obstetrics*, July, 1897.



Abdominal hysterorrhaphy is permissible not only for the above class of cases, but also for a very much larger class. The tumors, adhesions, and inflammations which contraindicate the shortening of the ligaments become at once the indications for abdominal section, to be followed, in case of reposition, by hysterorrhaphy; hence, the field for this operation is much wider. The greater freedom from dystocia in subsequent pregnancy, however, may finally lead to a preference for the operation of Palmer Dudley or Mann in place of abdominal hysterorrhaphy.

It would be unprofitable to detail the innumerable operations which have been devised and performed in the treatment of the posterior malpositions of the uterus. Some of these are not without merit; some are useless; many are injurious.

In Congenital Retroversion and Retroflexion it is doubtful whether any treatment, surgical or non-surgical, is of the least value. This form of displacement is usually associated with faulty development, both general and local. The concurrent symptoms also are due rather to general than to local causes.

#### Lateral Versions and Flexions.

The lateral malpositions which often complicate retroversion and retroflexion are usually the result of inflammation in a broad ligament or in the uterus itself, or in both. They are sometimes caused by a tumor of the uterus or its appendages. Their treatment is that of the causative inflammation or tumor, and follows the general principles which have been laid down for the treatment of these conditions. Pessaries are of little or no use.

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## CHAPTER XLVIII.

### ANTERIOR MALPOSITIONS. ANTEVERSION AND ANTEFLEXION.

#### PATHOLOGICAL ANTEVERSION.

SOMETIMES the physiological angle of flexure becomes obliterated in consequence of chronic metritis, and results in permanent straightening of the uterus. The cervix becomes elevated and fixed above, or the corpus depressed and fixed below the normal level. This constitutes pathological anteverision. Figure 375

Anteverision is often associated with pathological anteflexion. The mobility at the angle of flexure is then increased, diminished, or absent; the flexure is then the significant factor, and will be considered under Pathological Anteflexion.

### Etiology and Symptoms.

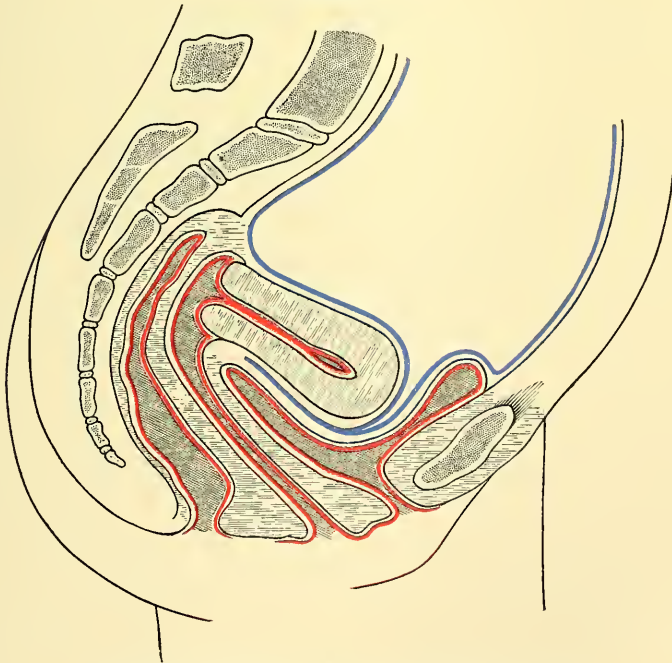
The exaggerated anteversion of early pregnancy is physiological; the exaggerated anteversion of the uterus in chronic metritis is pathological. Elevation of the cervix and depression of the corpus may be induced by peritoneal adhesions. Increased weight from a mural myoma may also depress the corpus.

The symptoms are due to the pelvic inflammations and other complications already mentioned. The increased weight of the uterus, which is usually hypertrophied from metritis, generally causes a dragging sensation, especially if the organ be prolapsed. The enlarged corpus occupying the territory of the bladder often induces persistent vesical irritation or even cystitis. Menorrhagia, when present, is the result of the metritis or of a myoma rather than of the displacement *per se*.

### Diagnosis and Prognosis.

The displacement is recognized by digital touch, which discloses the anterior wall of the enlarged uterus parallel to the anterior wall of the vagina, with the fundus close to the symphysis and the cervix ele-

FIGURE 375.



Pathological anteversion. Mobility at angle of flexure lost.

vated. Conjoined examination will show the size, shape, hardness, and degree of fixation. Exaggerated anteversion of the healthy uterus is not necessarily pathological in its results. This is illustrated by the

anteversion of early pregnancy. The prognosis is therefore good if the complications can be removed.

#### Treatment.

If exaggerated anteversion is the position taken by the uterus in chronic metritis, it follows that the treatment is often that of chronic metritis. For the treatment of metritis, perimetritis, myoma, menorrhagia, and other complications and lesions associated with the displacement, the reader is referred to those subjects. Irritable bladder, which is often a mechanical result of the displacement and enlargement, may sometimes be relieved by means of an Albert Smith or Hodge pessary, which lifts the organ to a higher level away from the bladder. In thus elevating the uterus the anteversion may be rather increased than diminished. This proves that the symptoms were dependent not upon the anteversion, but rather upon descent and antelocation. Should the parts be too sensitive to tolerate the hard-rubber pessary or a flexible rubber ring, the daily application of medicated pledgets of lamb's wool may give support to the uterus and decrease the tenderness until the more permanent instrument can be worn. The numerous anteversion pessaries designed to elevate the corpus by direct pressure on the anterior wall of the uterus generally irritate the organ and thereby aggravate the inflammatory complications. They are therefore to be used with caution or not at all.

#### PATHOLOGICAL ANTEFLEXION.

A comprehensive study of pathological anteflexion would have to take into account the abnormal conditions usually associated with it; these may have the relation of cause or of effect, or be a concurrent result of some common cause.

A distinction between normal and pathological anteflexion would show that an essential factor in the former is mobility at the angle of flexure which permits the degree of flexure to vary within certain defined limits. The limit of normal anteflexion is approximately  $90^\circ$ . The physiological variation is somewhat commensurate with the varying quantity of fluid in the bladder.

The body of the uterus rests upon the bladder, and must rise as the bladder becomes distended. Conversely, if the urine be drawn through a catheter, even while the woman is lying on her back, the corpus, notwithstanding the opposing influence of its own weight, immediately follows the receding wall of the bladder and returns, through an angle of  $45^\circ$  or possibly even  $90^\circ$ , to its accustomed position.

The normal forward bending of the corpus upon the cervix uteri when the bladder is empty makes an angle of which the approximate physiological limits are between  $45^\circ$  and  $90^\circ$ ; the flexure, therefore, would generally be pathological if less than  $45^\circ$  or more than  $90^\circ$ . Furthermore, if the flexure, whether it be normal or abnormal in extent, does not disappear upon filling the bladder, but remains constant under all conditions, the rigidity makes the flexure pathological.



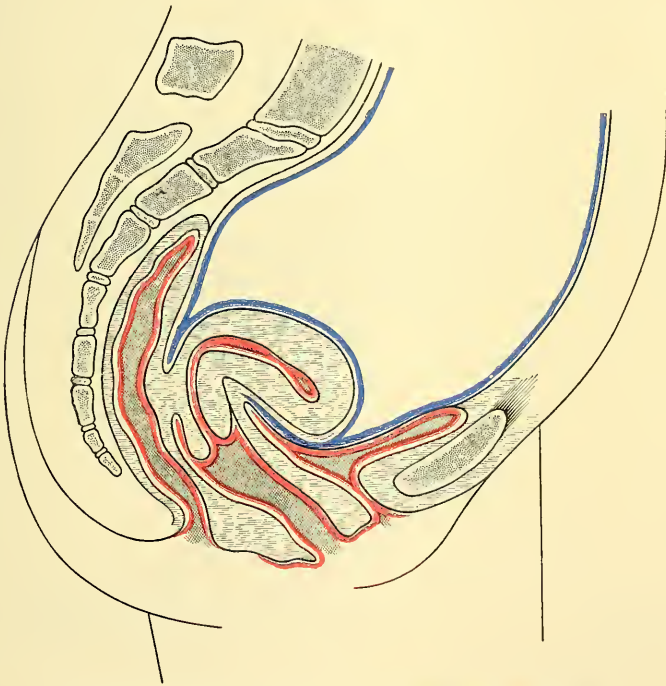
Anteflexion is, therefore, pathological if the mobility at the angle of flexure is increased or diminished or absent.

#### Etiology and Classification.

Anteflexion may be either congenital or acquired.

*Congenital Anteflexion.* The uterus is bent upon itself almost double, the body and cervix both pointing in the direction of the pelvic outlet. The cervix is somewhat elongated and situated in the long axis of the vagina; see Figure 376. This is known as infantile uterus. By congenital is meant not necessarily defective foetal development, but failure of the immature child-uterus to develop at puberty, a failure which usually pertains alike to the uterus, Fallopian tubes, ovaries, and vagina.

FIGURE 376.



Congenital anteflexion; both cervix and corpus uteri bent forward.

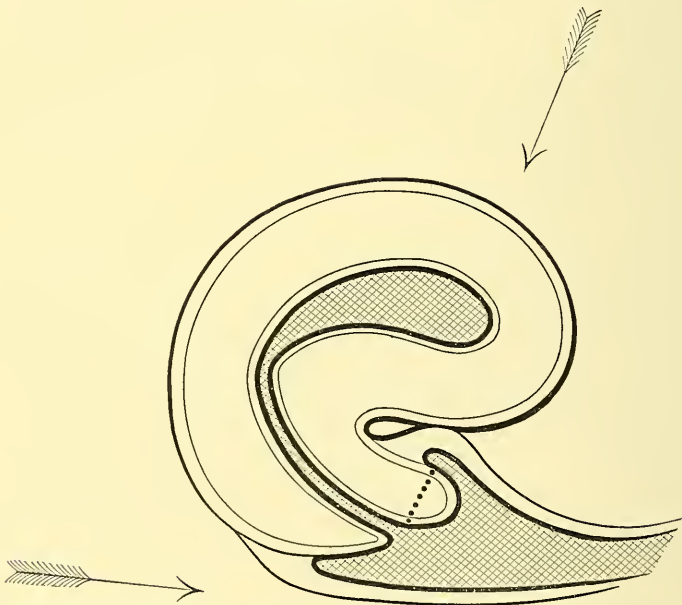
*Acquired Anteflexion* may be simply an exaggeration of the normal flexure, due either to increased weight of the corpus from the presence of a myoma near the fundus, or to unequal growth of the uterine walls, or to unequal involution, or to an abnormally soft, mobile condition of the uterine walls. A not infrequent cause of anteflexion is thickening of the posterior wall of the uterus from the products of inflammation, and a corresponding atrophy of the anterior wall from prolonged pressure at the angle of flexure. This condition is apt to

be associated with post-uterine inflammation involving the utero-sacral ligaments, a frequent and discouraging complication. Sometimes the inflamed ligaments contract and drag the anteflexed uterus upward and backward, where it may be permanently fixed in its post-uterine location by peritoneal adhesions.

### Pathology.

Peri-uterine inflammations, having the relation either of cause or effect to the flexure, often bind the pelvic organs together in a mass of exudate, with resulting failure of nutrition, nerve-irritation, and constant pain, which sometimes render the patient's life miserable and useless. Constriction or collapse of the uterine canal at the point of flexure may, by confining the secretions above, produce inflammation in the body of the uterus, Fallopian tubes, and ovaries. This is analogous to the cystitis, urethritis, pyelitis, and nephritis which follow

FIGURE 377.



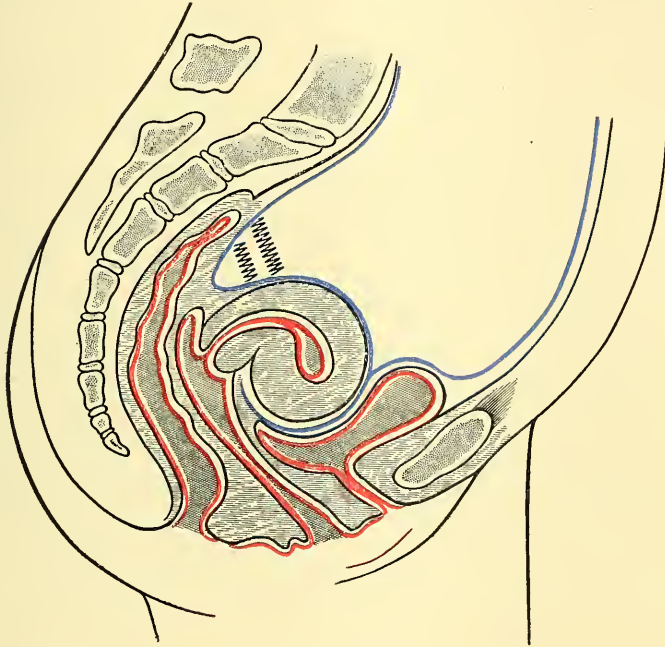
The arrows show the influence on the displacement of the forces produced by straining at stool.

stricture of the male urethra. As the fecal matter passes the cervix during defecation, force is applied to its posterior wall in the direction of the lower arrow, Figure 377. At the same time fixation of the abdominal muscles, due to straining, whether in urination or defecation, results in a force upon the corpus uteri in the direction of the upper arrow. Thus the flexure is increased and perpetuated with each act of defecation or urination.

## Symptoms and Course.

The numerous symptoms due to the inflammatory and other complications should not be confounded with those which directly depend upon the displacement. The symptoms of ante flexion may usually be referred, first, to the bladder and urethra, and second, to the uterus itself.

FIGURE 378.



Acquired ante flexion with post-uterine fixation. Want of mobility at angle of flexure.

The Vesical and Urethral Symptoms are produced either by the rigidity of the uterine tissue at the angle of flexure, which prevents the corpus uteri from rising out of the way of the filling bladder, or by the inflammatory shortening of the utero-sacral ligaments, which, by drawing the uterus upward and backward, put the vesico-vaginal wall on the stretch; this causes traction upon the neck of the bladder and consequent bladder and urethral irritation, and may even be the starting-point of cystitis and urethritis.

Vesical irritation caused by post-uterine inflammation and consequent contraction of the utero-sacral ligaments is often wrongly attributed to the mechanical pressure of the ante flexed fundus uteri upon the bladder; this is manifestly impossible, for the contracted utero-sacral supports hold the entire uterus back away from the bladder.

Uterine Symptoms. When the flexure has gone beyond the normal limit and become pathological, two principal results may occur, especially if there be immobility at the angle of flexure :



1. Collapse of the bloodvessels at the angle of flexure, with consequent obstruction of the circulation, passive congestion, and hypersecretion of a vitiated mucus.

2. Collapse and obstruction of the uterine canal at the angle of flexure, with consequent retention of the uterine secretions. The secretions may decompose and become a potent source of irritation; the uterine mucosa could then neither produce its normal menstrual decidua nor furnish a safe resting place for the impregnated ovum. The possible symptom-group dependent upon these two forms of obstruction includes *endometritis*, *dysmenorrhœa*, and *sterility*.

*Endometritis* may be caused and perpetuated by the endometrial and vascular obstruction. The causation of rhinitis from obstruction in the nasal passages and of cystitis from stricture of the urethra is closely analogous.

*Dysmenorrhœa* may depend upon collapse and constriction of the uterine canal at the angle of flexure. This causes the blood to accumulate and to coagulate in the body of the uterus, from which it is expelled at intervals by uterine contractions simulating labor pains. The pain, when due to this cause, is therefore always very severe just before the passage of a clot. *Dysmenorrhœa* may also be caused by similar collapse and consequent obstruction in the veins at the angle of flexure; this causes intense venous congestion of the entire body of the uterus; pain is then due to the pressure of the swollen vessels upon the nerve-filaments and to a consequent irritable condition of the muscular tissue of the uterus. Sometimes the uterine canal becomes temporarily straightened with the establishment of the flow; this removes the cause of the vascular obstruction, and the pain from congestion is relieved. It is clear that the pain would be intensified in a uterus hypersensitive from metritis, and especially from neuritis.

*Sterility* is due not so much to the failure of impregnation to occur as to the fact that the ovum, if impregnated, is unable to survive in the hostile environment of an infected endometrium. It is often claimed that the constriction in the uterine canal *per se* prevents the entrance of spermatozoa, and therefore causes the sterility. This in a measure may be true, but the endometritis which results from the obstruction is the more direct and frequent cause.

#### Diagnosis.

Before the distinction had been made between physiological and pathological antelexion, it was usual to treat all antelexions as pathological. The reaction came, and with it a universal proposition that antelexion had no pathological significance *per se*, that it was wholly a question of the associated lesions. But, like other universal propositions, this one was too sweeping: it did not take into account pathological antelexion.

The educated touch which distinguishes the normal version, flexion, and movements of the uterus will appreciate the anatomical differences between pathological and normal antelexion. The degree of flexure, the mobility or rigidity, and the size, shape, location, and consistency

of the uterus may be ascertained by conjoined manipulation. The presence of post-uterine inflammation is recognized by the pain caused in dragging the uterus slightly forward, and by increased thickness and tenderness which may be felt by vaginal or rectal touch in the region of the utero-sacral ligaments. Antelexion is distinguished from myoma in the anterior wall of the uterus by conjoined examination and the sound. The common error of mistaking the normal version and flexion of a prolapsed uterus for pathological version and flexion has been exposed on page 526.

FIGURE 379.



Myoma on the anterior uterine wall simulating antelexion.

### Treatment.

The treatment is directed, first, to the complications; second, to the *mechanical indications* for straightening the flexed uterus.

**The Treatment of the Complications** If there be inflammation of the uterus and its surroundings, either in the relation of cause or effect, its removal becomes the prime indication, because, unless removed, it is a positive contraindication to the more direct treatment of the malposition itself. The sole mechanical treatment may be the removal of a tumor or the separation of adhesions. Incurable chronic metritis may render all mechanical treatment useless. Improvement in the general health, treatment of other complications, and palliation then become the only resources.

Before considering the various recognized measures for the direct

treatment of the flexure itself, it is important to exclude all cases of normal ante-flexion. It would be clearly absurd to treat normal ante-flexion for dysmenorrhœa or sterility.

The Mechanical Indication, when the flexure is pathological, is clearly to straighten the uterus, so that :

*a.* The uterus may be out of the range of the forces indicated by the arrows in Figure 377.

*b.* The circulation may be relieved.

*c.* The uterine canal may perform its natural functions as a drainage-tube.

The mechanical treatment may include the following measures :

1. The pessary.
2. Local massage.
3. Electricity.
4. Forcible dilatation.
5. Posterior division of the cervix.
6. The author's operation.

1. *The Pessary.* The various ante-flexion and anterversion pessaries which have been devised for the purpose of propping up the corpus are almost useless. Their false reputation depends upon the relief which they frequently give to complicating prolapse, the symptoms of which have been wrongly attributed to ante-flexion and anteversion. If pessaries are indicated at all, therefore, they may be used under the same principle as in descent. See Treatment of Descent, page 532. Intra-uterine stem-pessaries designed to straighten the flexed uterus are sometimes effective, always dangerous.

2. *Local pelvic massage,* as described in Chapter L., is a much neglected and most valuable remedy for the relief of the inflammatory complications, especially those of the utero-sacral ligaments.

3. *Electricity* in the hands of its advocates is said to be a useful agent ; it is, however, by no means effective enough to stand alone as the accepted treatment of pathological ante-flexion. After considerable personal experience the writer has discarded it.

4. *Forcible Dilatation.* This operation is described on page 97 ; it is indicated in ante-flexion with collapsed or stenosed uterine canal which has produced endometritis, dysmenorrhœa, or sterility.

The following, with some modifications, is an abstract of a valuable contribution<sup>1</sup> by Goodell, of Philadelphia, in which he gives positive indorsement to rapid dilatation as proposed by Ellinger and others. The instruments recommended are two Ellinger dilators, which are preferred on account of the parallel action of their blades. The dilatation is commenced with the smaller instrument and completed with the larger, which has powerful blades that do not spring or feather. The light instrument needs only a ratchet in the handle, but the stronger one has a screw which forces the handles together and the blades apart. To prevent injury to the fundus when the instrument is open, the length of the blades is limited to two inches. The larger instrument has a dilating power of one and a half inches, and has a graduated arc in the handles which indicates the divergence of the blades. Goodell's

<sup>1</sup> American Journal of Obstetrics, 1884, p. 1179.



modification of Ellinger's dilator is provided with serrated blades, to prevent them from slipping out of the canal during the process of dilatation.

For dysmenorrhœa or sterility due to flexion or stenosis the method of operation is as follows: A suppository containing a grain of the aqueous extract of opium is introduced into the rectum, the patient etherized, and the uterus exposed by Sims' speculum. The cervix is held by a tenaculum, and the smaller dilator is introduced as far as it will go. Upon gently stretching open that portion of the uterine canal which it occupies, the stricture above so yields that when the blades are closed they will pass higher. By repeating this manœuvre a cervical canal is tunnelled out which before would not admit the finest probe. Should the os externum or cervical canal be too small to admit the instrument, a pair of pointed scissors may be substituted, and by the same opening and closing motions the canal may be prepared for the introduction of the smaller dilator. As soon as the cavity of the uterus has been entered the handles are brought together. This dilator is then withdrawn, the larger one introduced, and its handles slowly screwed together. If the flexure be very marked, the larger instrument after being withdrawn should be introduced with its curve in the opposite direction to that of the flexure, and the final dilatation made with the dilator in this position. But in reversing the curve the operator should take care not to rotate the organ upon its own axis, and not to mistake a twist thus made for a reversal of the flexure; the ether is then withheld, and the instrument allowed to remain in place until the patient begins to flinch, when it is removed. The best time for the dilatation is midway between the monthly periods. In the majority of cases the dilatation should be carried to about one and a quarter inches. The infantile uterus which has failed to develop at puberty has thin, unyielding walls, and should therefore not be dilated more than three-fourths of an inch to an inch. In using the larger instrument it is usually necessary to have the assistant make decided counter-traction with the vulsella forceps to prevent the blades of the dilator from slipping out. The cervix is sometimes lacerated, but not sufficiently to produce unpleasant results. Goodell's statistics include one hundred and fifty operations of full dilatation under ether, with no fatal result and without serious inflammatory disturbance.

After forcible dilatation under ether the cervical canal may remain relatively open and straight, and a symptomatic cure may be effected. Too often, however, the canal returns to its previously angular condition, and the dysmenorrhœa and sterility continue. The comparative safety of forcible dilatation in the hands of a skilful and experienced gynecologist may be contrasted with its great danger when undertaken by a careless septic operator unacquainted with the special requirements of uterine surgery. Peri-uterine inflammation is ordinarily considered a contraindication to the operation.

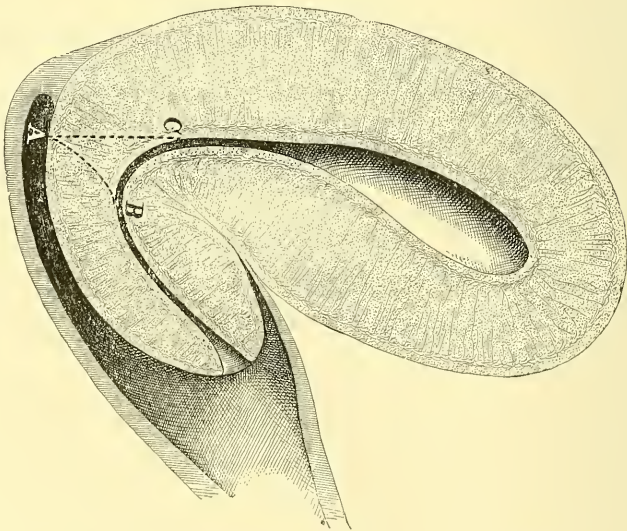
Dilatation by means of tents is transient in its results and dangerous to life. The operation has given frequent and serious warnings in the shape of pelvic infections, which, if not destructive to life, have been almost as disastrous in their influence upon health.

5. *Posterior division of the cervix* is an operation devised and once extensively practised by Marion Sims and his followers; it was designed to straighten the uterine canal by making a direct outlet from the point of flexure directly through the posterior wall of the cervix. The operation was not without merit, but it fell into disrepute because, first, it was often done in normal anteflexions; and, second, because, while it overcame the obstruction in the uterine canal, it did not straighten the uterus and so relieve the more important obstruction in the bloodvessels. Moreover, the divided cervix was prone to reunite and leave a cicatricial contraction at the os externum. The operation was in the right direction, but was inadequate.

6. *The author's operation*<sup>1</sup> about to be described has for its object the utilization of dilatation and of posterior division of the cervix in such a way as not only to enlarge the calibre of the uterine canal, but also to straighten the uterus and thereby overcome the circulatory obstruction. The operation is performed as follows:

Everything connected with the operation has been rendered surgically clean. Under ether, the uterus is exposed by Sims' speculum. The uterine canal is dilated by means of a Palmer dilator, followed by an Ellinger dilator, sufficiently to permit the introduction of a small, sharp curette, but not necessarily to the extent advocated by Goodell. Curet-

FIGURE 380.

Lines of incision in flexion of the uterus. Sims' operation.<sup>2</sup>

tage is performed as directed on page 207 for endometritis; it may give only negative results and be, therefore, simply exploratory, or it may give evidence of pronounced endometritis; if the latter, it is imperative

<sup>1</sup> E. C. Dudley. "A Plastic Operation Designed to Straighten the Anteflexed Uterus." American Journal of Obstetrics, 1891. vol. xxiv. No. 2.

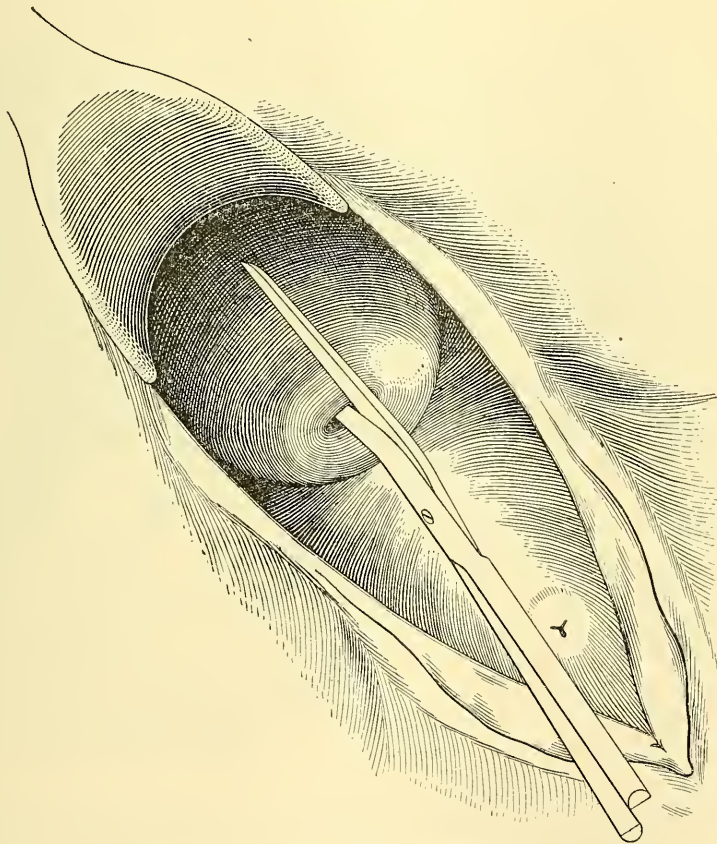
<sup>2</sup> Emmet. Principles and Practice of Gynecology, second edition, p. 359.

as a preliminary aseptic step, not only to the plastic part of the operation, but as a curative measure.

The cervix is divided with scissors backward in the median line past the utero-vaginal attachment nearly to the utero-peritoneal fold in the pouch of Douglas. See Figure 381.

The cut surfaces thus incised are then held widely apart by means of two tenacula in the hands of an assistant; the incision is somewhat deepened by means of a scalpel, especially in the uterine wall next to the cervical canal, and a small angle is cut out on either side as shown by the dotted lines in Figure 382. The cut surface on each side is now folded on itself by a single silkworm-gut suture, as shown

FIGURE 381.



The posterior wall of the cervix being divided by the scissors.

in Figure 382. This suture is tied and fortified by interrupted sutures on either side. The lines of union thus made are shown in Figure 383.

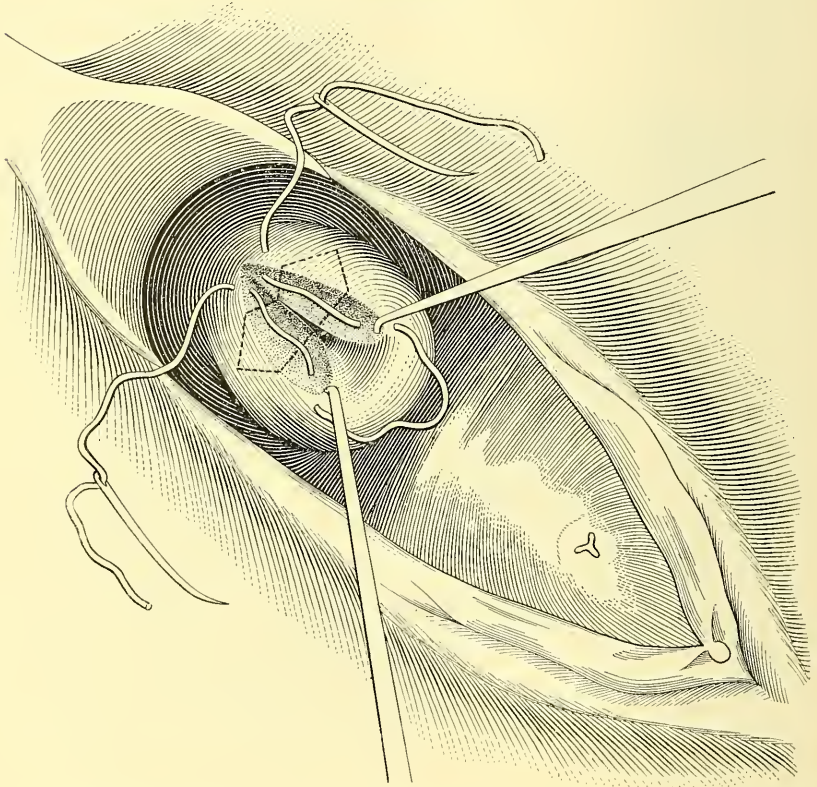
These sutures are not introduced in such a manner as to stitch the intracervical to the vaginal margin of the wound, but the cut surface is folded upon itself in a direction at right angles to this. On either



side that point at the margin of the os externum where the backward incision commenced is stitched to the very angle of the incision, so that each cut surface is folded upon itself, not from within outward, but from before backward. Thereby the os externum is carried directly back to the angle of the incision. The cervix now points backward in its normal direction toward the hollow of the sacrum, instead of forward toward the vaginal outlet. See Figure 383.

In some cases of extreme anteflexion there is a disproportionately long anterior lip. This elongation is shown by the dotted line in Figure 377. It is the result of a relatively greater pressure on the posterior lip by the posterior vaginal wall; this lip should be caught

FIGURE 382.



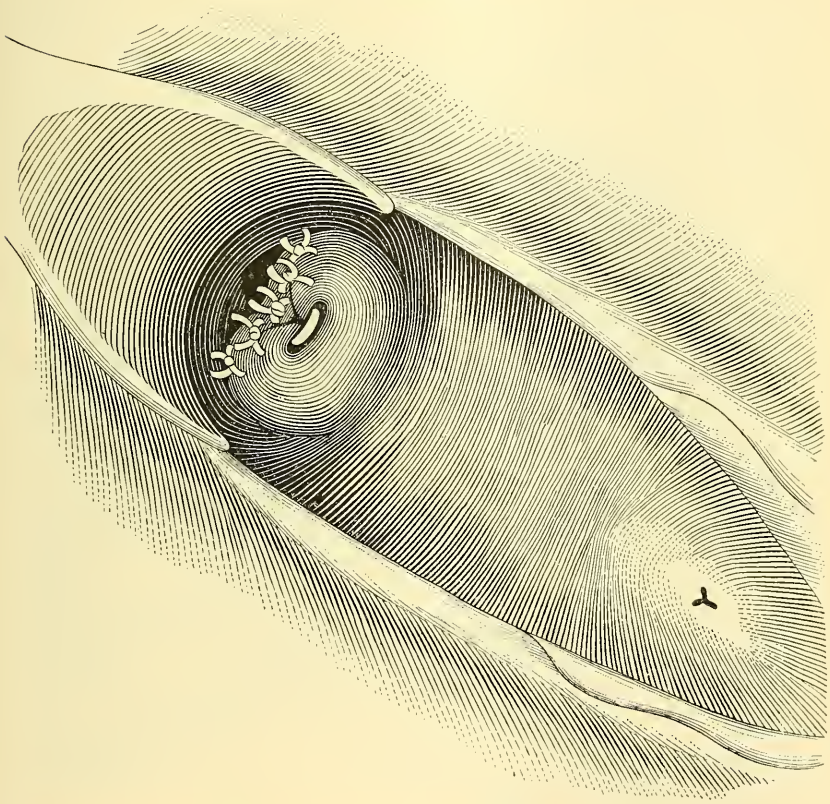
The cut surfaces held apart by tenacula. The dotted lines show wedge-shaped pieces to be removed by scissors in order to make the cut surfaces more readily fold upon themselves. Suture designed to fold cut surfaces on themselves in place, but not tied.

with the tenaculum and partially removed by the scissors. The incised surface is then closed upon itself with sutures as shown in Figure 384. The dotted line in Figure 377 shows in section the line of incision through the protruding lip; the incision should extend to but not into the os externum. This part of the operation is not required unless

the anterior lip decidedly protrudes, and is therefore usually omitted. The removal of a portion of the lip in a suitable case is not only not a mutilation, but it even contributes to the straightening of the uterus.

Conjoined examination upon completion of the operation in each of the author's cases has invariably shown the uterus either to have been straightened or the antelexion to have been reduced to a degree quite within physiological limits. The results have been substantially the same whether the point of flexure was at the os internum or below it.

FIGURE 383.



Suture shown in previous cut tied, and additional sutures designed to fortify this one also introduced and tied. This ordinarily completes the operation.

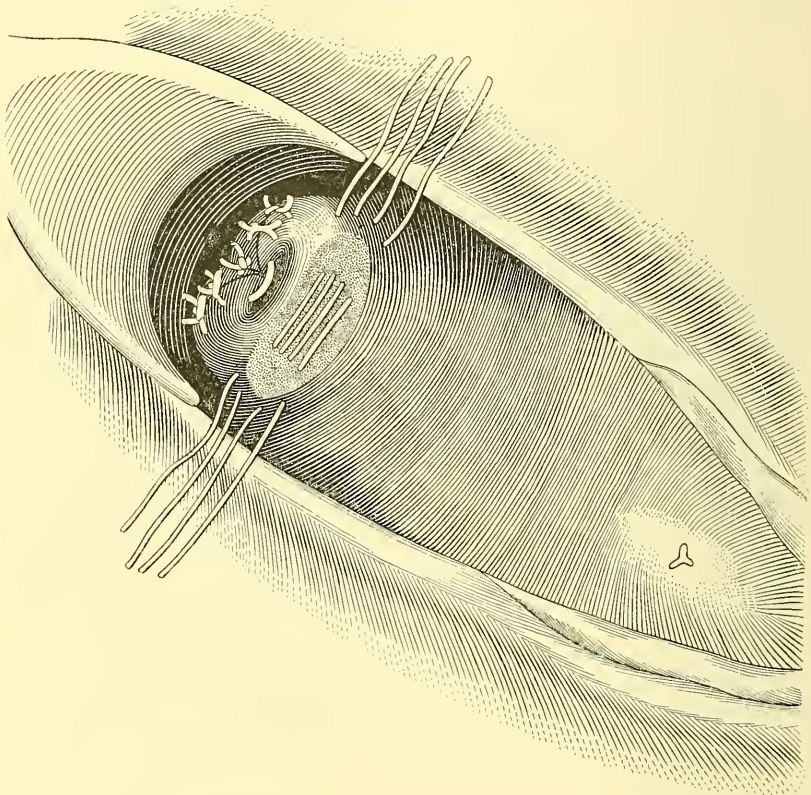
The two posterior lines of sutures have the effect of transplanting the os externum to the very angle of the posterior incision. The anterior sutures, if used, have the effect of carrying the cervix back by a distance equal to one-half the length of the anterior cut surface, which is doubled upon itself. By these means a permanent change, quite equal to overcoming the flexure, is effected in the direction of the cervix. As the result of the anterior portion of the operation the uterus in a suitable case is lifted also in a higher plane in the pelvis,



where it ceases to be a mechanical irritant to the bladder. This portion of the operation may therefore be indicated for descent when complicated with antelexion.

The writer has not undertaken this operation on the small, undeveloped infantile uterus. The so-called congenital antelexion is only one factor in a general failure of development, a failure which pertains not to the uterus and other reproductive organs alone, but to the general system. The amenorrhœa or very scanty menstruations and

FIGURE 384.



Anterior lip excised and sutures in place ready to tie.

sterility usually associated with this condition, being only the local expressions of faulty general development are not reached by any uterine treatment, surgical or non-surgical.

This operation was first published in November, 1890.<sup>1</sup> At that time the writer reported eighteen cases. The results were classified under two columns, one for the mechanical and one for the symptomatic results. The mechanical result was invariably a satisfactory straight-

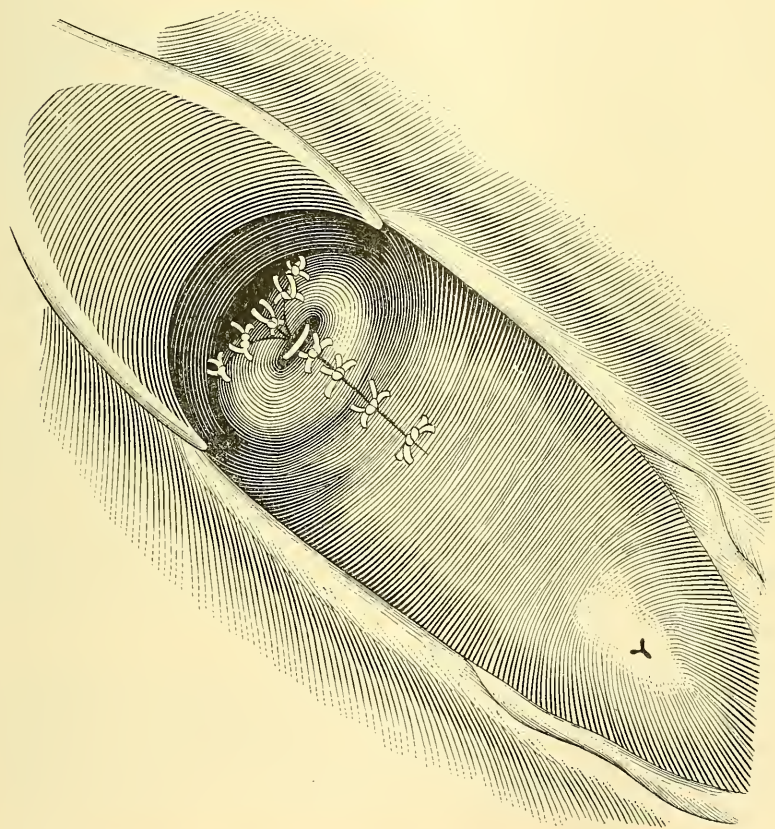
<sup>1</sup> Paper by E. C. Dudley, read before the New York Obstetrical Society, November 18, 1890.



ening of the uterus. The symptoms were satisfactorily relieved in about three-fourths of the cases. The author's personal experience with this operation now numbers about fifty cases. With this larger experience and larger observation of the symptomatic results he is able to verify the conclusions formed when the operation was given to the profession. In no case has the operation failed to give an anatomical cure. The symptomatic results have been satisfactory in about 75 per cent. of all cases.

The symptomatic indication in the great majority of cases was dysmenorrhœa. This symptom, when the flexure was uncomplicated by peri-uterine inflammation—that is, when the conditions were mechan-

FIGURE 385.



Sutures tied and operation complete both on posterior and anterior lips.

ical—has been quite generally relieved. In seven cases the indication was prolonged sterility. In three of these cases normal parturition has taken place.

The operation is not presented as a panacea for all the maladies of pelvic origin in which there happens to be a pathological anteversion.

Cases are numerous in which antelexion is rather an incidental than an essential factor. The hope is that the operation may prove of value when the indication to be fulfilled is wholly or in part mechanical.

There is danger that this operation will be performed indiscriminately in cases not of pathological, but of physiological antelexion. It is even probable that those who do not consider antelexion as having any pathological significance *per se* do not always make the distinction between the physiological and pathological position. Clearly a woman might have antelexion and have a large variety of lesions wholly independent of it. To say this, after all, might only be saying that a woman may have a variety of pathological developments in the pelvis, and at the same time have the uterus in its normal position. Normal antelexion could, of course, have no pathological significance.

Since the investigations of Schultze and others we may distinguish downright pathological antelexion, in which the uterus is bent to the point of producing two kinds of obstruction at the angle of flexure: 1. Obstruction of the canal from collapse of the canal. 2. Obstruction of the bloodvessels from collapse of the bloodvessels. Under such conditions uterine catarrh, as pointed out in the foregoing paragraphs, is apt to follow. Normal physiological changes cannot take place either in the decidua of menstruation or in the decidua of pregnancy; hence, menstrual disorders and sterility.

The mechanical indication is clear: Straighten the uterus and thereby relieve the obstruction both in the uterine canal and in the vessels.

The operation is not a substitute for dilatation and curettage, but rather supplementary to these two procedures.

The writer has practised extreme divulsion with curettement in many cases of antelexion, but the results were not very satisfactory. They are, however, more gratifying when the plastic operation already described is added to the dilatation and curettage.

If it is wrong to treat antelexion mechanically, because it is a result of certain associated lesions, it follows that retroflexion and all other displacements should not be treated mechanically, because they also are equally the result of associated lesions. This almost amounts to the *reductio ad absurdum*.

One hears much of inflammation of the utero-sacral ligaments as the great associated lesion in pathological antelexion, and is yet often disappointed in his search for evidence of such inflammation. Inflammation often exists there, but in a large proportion of such cases it has all passed away, leaving pathological antelexion as a permanent result.

## CHAPTER XLIX.

INVERSION OF THE UTERUS. HERNIA OF THE UTERUS  
AND OVARY.

## INVERSION OF THE UTERUS.

INVERSION of the uterus is the partial or complete turning of the organ inside out. The difference between partial and complete inversion is simply one of degree. In partial inversion some part of the wall of the corpus uteri, usually the fundus, is depressed into the uterine cavity, but the organ does not protrude through the external os into the vagina. In complete inversion the uterus has turned completely inside out. The inverted uterus is then inside the vagina, or, if the vagina is also inverted, both organs will be, to quote Hippocrates, between the thighs, "*velut scrotum.*"<sup>1</sup> Figures 386 and 387 represent the incomplete and complete forms of inversion.

FIGURE 386.

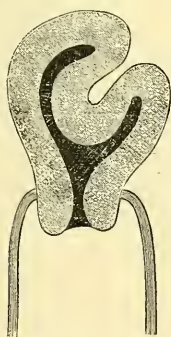
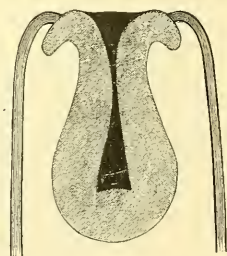
Partial inversion.<sup>2</sup>

FIGURE 387.

Complete inversion.<sup>2</sup>

## Etiology.

The causes usually assigned are traction on the cord in the delivery of the placenta, rapid delivery of the child by traction, traction by gravity of intra-uterine tumors, or traction exerted in their delivery. These causes, however, are all inadequate to cause the accident unless the muscular walls of the uterus are in a state of relaxation. Paralysis or great relaxation of the uterine wall is the essential cause of the accident. Undue importance has been given to the various forms of traction, even coughing or sneezing may invert a very relaxed uterus.<sup>3</sup>

Inversion in the majority of cases occurs spontaneously as a direct result of paralysis of uterine muscles. This paralysis may pertain to

<sup>1</sup> Hippocrates. From Thomas and Mundé.

<sup>2</sup> Thomas and Mundé. Diseases of Women.

<sup>3</sup> Adaptation from Thomas and Mundé. Diseases of Women.



any part or all of the uterine wall, but is usually most pronounced at the placental site. The paralyzed portion is first depressed into the uterine cavity so as to give the corpus uteri the appearance of the bottom of a junk bottle. The remaining portion of the muscular wall not being paralyzed may contract and seize the partially inverted paralyzed portion, and push it down and down until the inversion is complete.

The conditions which most favor paralysis and relaxation of the muscular layers are not wholly known. The accident in about 88 per cent. of all cases is associated with childbirth;<sup>1</sup> hence the inference that the most active causes are connected with utero-gestation and parturition. In a small proportion of cases the accident has followed distention of the endometrium by retained fluids or tumors. The hemorrhage

FIGURE 388.



Complete inversion of the uterus. The inverted organ is in the vagina.

which is often associated with muscular relaxation of the uterus is not a cause but a result of the relaxation. Finally, we may say that the condition in a large proportion of cases arises without definite assignable cause. The accident occurred at the Rotunda Hospital but once in 190,800, and at the Vienna Lying-in Hospital but once in 250,000 deliveries.<sup>2</sup>

Spontaneous inversion has occurred in the virgin uterus of intact hymen without the least traction.<sup>3</sup>

<sup>1</sup> Crosse. *Loc. cit.*

<sup>3</sup> Thomas and Mundé. *Diseases of Women.*

<sup>2</sup> Playfair and Allbutt. *System of Gynecology.*

A most instructive case has been recorded by Willard Parker, as follows:

“A young woman who had borne one child seven or eight years previously, and had never had any recognized uterine disease, while making a violent effort in rolling tenpins suddenly felt something give way within her, after which she suffered the most intense pain and became completely disabled. Dr. Parker, being called to see her, after a hasty examination coincided with the opinion of the attending physician that a polypus had been suddenly expelled and was hanging in the vagina. Impressed with this belief he removed the whole mass, when, to his surprise, he held in his hands the inverted uterus with its tubes and ligaments. The patient recovered without any bad symptoms, and subsequently menstruated regularly.”<sup>1</sup>

The occasional occurrence of spontaneous replacement of a uterus which had been inverted is a fact no less remarkable than spontaneous inversion, and has been repeatedly observed. In one case the replacement occurred while the patient was straining at stool.<sup>2</sup>

#### Mechanism and Pathology.

If the entire uterine walls are paralyzed, the organ may invert as the result of traction or coughing or sneezing, or of its own weight. Intra-abdominal force from above may push the paralyzed uterine wall through the os externum into the vagina. If the paralysis pertains only to a part of the uterine wall, the inversion, as already explained, may occur by contraction of the non-paralyzed portion. Clearly, inversion cannot take place when the entire uterine wall is active. It may, however, do so when the paralysis is partial and the activity is partial. Regional paralysis, as already stated, is more apt to occur at the placental site, where the wall is thinner and softer. It more frequently occurs at the fundus or at one of the horns.

In some cases the inversion takes place from below upward—that is, the relaxed cervical portion comes down as in prolapse of the anus. This process begins as eversion and continues until the whole organ is inverted.

#### Anatomy and Pathology.

The inversion, if not complete, may have been arrested at any point. Thus the inverted portion may be above the internal or external os, or it may consist of the entire uterus rolled out into the vagina, or, together with the inverted vagina, the out-turned uterus may be outside of the vulva. The uterine mucosa now exposed is dark-red or purple from congestion; there may be regional ecchymosis, erosion, and ulceration. Adhesions have been known to form between the wholly extruded uterus and the vagina. The writer has observed one case in which such adhesions had formed between the partially inverted corpus and the cervical mucosa.

There is hemorrhage from the extruded and inflamed uterine mucosa.

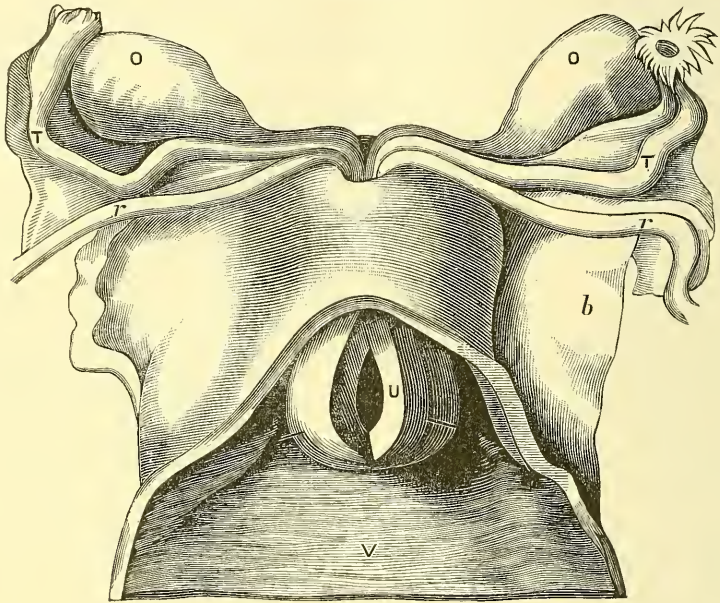
<sup>1</sup> Loc. cit.

<sup>2</sup> Thomas. Diseases of Women.

In the combined inversion of the uterus and vagina the mucosa, after long exposure to external influences, may become dry, wrinkled, and parchment-like, as does the vagina in complete procidentia of the uninverted uterus; the two conditions have been mistaken for one another.

The vessels are strangulated; circulation is impeded; the nutrition of the organ suffers and some degree of infection is almost inevitable. In rare instances gangrene and sloughing of the inverted portion have taken place.

FIGURE 389.



The inverted uterus, U, lying in the vagina, V, is cut open to show the peritoneal sac which does not contain the ovaries, O; bristles are passed into the uterine orifices of the tubes; b, broad ligament; r, r, round ligaments; T, T, tubes.<sup>1</sup>

The uterine ligaments, Fallopian tubes, ovaries, and even intestines may at first be drawn into the peritoneal cup of the inverted organ. Rarely these organs become adherent within the cup; usually, with returning uterine activity and contraction, they are expelled and remain outside.

### Symptoms.

The symptoms of acute complete inversion of sudden occurrence are as follows:

- Fixed intense pain.
- Profuse hemorrhage.
- Shock and collapse.

Partial inversion may occur with no characteristic symptoms, and without physical examination may escape notice.

<sup>1</sup> Crosse. Hart and Barbour, Manual of Gynecology.



Chronic inversion may have developed slowly, and therefore been largely chronic from the beginning, or it may follow the acute. It causes :

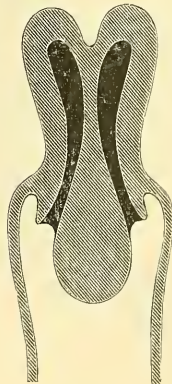
- Mechanical disorders of the urinary organs and rectum.
- Hemorrhage, more or less profuse, and anæmia.
- Bloody, purulent, or serous discharges.
- Difficulty of walking and standing.
- Pelvic pain.

Nerve exhaustion and impaired health necessarily follow. Life may be destroyed slowly by the exhaustive drain or at any time rapidly by acute peritonitis. In rare instances, especially after the menopause, there may be only slight inconvenience or none at all.

#### Diagnosis.

If the abdominal walls are relaxed and thin, and permit adequate palpation of all the intrapelvic organs, conjoined examination will show, first, the absence of a part or a whole of the uterus in the place where it normally belongs, and, second, its presence inverted partially or wholly into the vagina or into the uterine canal. The concavity or peritoneal depression caused by the inversion may sometimes be felt through the abdominal wall. Rectal touch or combined rectal and vaginal touch, with the hand over the abdomen or the sound in the bladder, may facilitate the diagnosis; see page 57. The finger in the rectum may be made to meet the hand over the abdomen or the sound in the bladder, and thereby demonstrate the absence of a uterus above the vagina. The orifices of the Fallopian tubes now rolled out and exposed also may be demonstrable. In case of rigid thick abdominal walls, the diagnosis will be more difficult.

FIGURE 390.



Uterine polypus with partial inversion.<sup>1</sup>

The differential diagnosis, in a given case, may raise two questions: First, is the protruding mass a uterine myoma or polypus, or a vaginal tumor? second, is it a prolapsed uterus?

<sup>1</sup> Hart and Barbour. Manual of Gynecology.

*Is it Complete Inversion?*

1. No pedunculated attachment to uterus.
2. Uterine cavity being obliterated, sound can be passed but short distance in incomplete and not at all in complete inversion.
3. Vaginal or rectal conjoined examination shows a ring or depression, and fails to show the uterus above the vagina.
4. The inverted uterus is a symmetrical pyriform body.
5. Orifices of the Fallopian tubes usually demonstrable.
6. Muciparous glands of the uterus present and microscopically demonstrable.

*Is it Myoma or Polypus?*

1. Attached to uterine wall by broad surface or by narrow pedicle.
2. Sound passes by the side of the mass through external os far into uterine cavity.
3. Uterus felt above vagina.
4. Not usually symmetrical and may be very asymmetrical.
5. Not present.
6. Not present, or if present less perfectly developed.

FIGURE 391.



Uterine polypus in vagina simulating partially inverted uterus. Adhesions have formed between polypus and os externum.

*Is it Incomplete Inversion of the Uterus?*

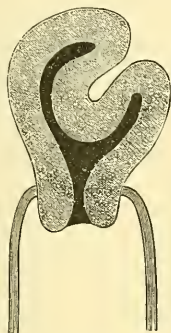
1. The uterine cavity as measured by the sound will be diminished.
2. Development sudden.
3. Bimanual examination shows ring-like depression in wall of uterus.
4. Usually dates from parturition.

*Is it an Intra-uterine Myoma?*

1. Cavity enlarged.
2. Development gradual.
3. Uterus symmetrical or asymmetrical, but no ring-like depression.
4. No parturition.

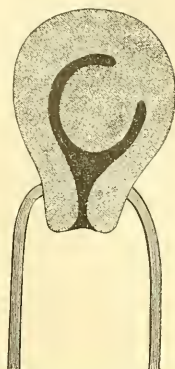
The great difficulty in some cases of making the differential diagnosis between a polypus or myoma and an inverted uterus is emphasized by

FIGURE 392.



Incomplete inversion of the uterus simulating myoma.<sup>1</sup>

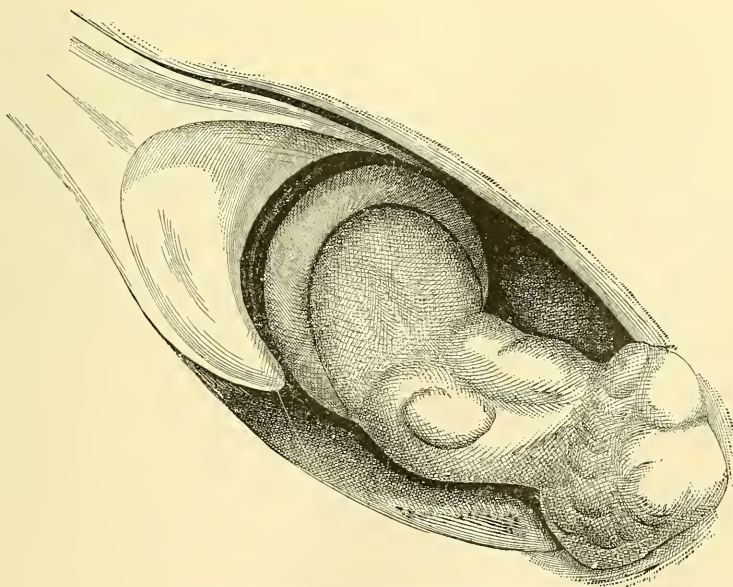
FIGURE 393.



Intra-uterine myoma simulating inversion.<sup>1</sup>

the fact that deservedly eminent surgeons have repeatedly extirpated the partially or wholly inverted uterus under the mistaken diagnosis

FIGURE 394.



Complete inversion with attached myoma.<sup>2</sup>

of a myoma. Conversely, the effort has been made to reduce a supposedly inverted uterus when the extruding mass was a myoma. The

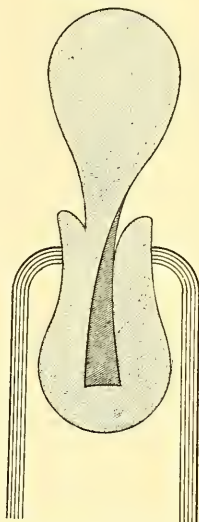
<sup>1</sup> Thomas. Diseases of Women.

<sup>2</sup> Emmet. Principles and Practice of Gynecology.



author personally recalls a case at the Woman's Hospital in the City of New York, upon which such an attempt was persistently made by one of the most eminent members of the visiting staff of that institution.

FIGURE 395.



Inverted uterus complicated by a subperitoneal myoma which gives the physical signs of a normal uterus.

In rare cases the diagnosis has been obscured by the presence of an inverted uterus in the vagina and a subperitoneal myoma of the size, shape, consistency, and position of a normal uterus. The distinction between the two bodies might then depend solely upon the presence or absence of the orifices of the Fallopian tubes in the vaginal mass. Ordinary care and intelligence, however, will usually enable the surgeon to avoid serious mistakes. Velveau, quoted by Simpson, once sagely remarked, however, that in some cases doubt is the only rational opinion.<sup>1</sup>

The differential diagnosis between inversion and procidentia uteri will usually be easy.

*Is it Inversio Uteri?*

1. The protruding mass is wider below than above.
2. External os uteri absent and tubal orifices present at lower end of mass.
3. Sound in urethra goes upward into bladder.

*Exception.*—When the vagina is concurrently inverted the sound may pass downward.

*Is it Complete Procidentia Uteri?*

1. Mass wider above.
2. External os present and tubal openings absent.
3. Sound goes downward into anterior portion of mass.

In the diagnosis and differential diagnosis, inspection and conjoined examination and the sound furnish the most reliable information.

<sup>1</sup> Playfair and Allbutt. A System of Gynecology.

### Prognosis.

If replacement can be promptly effected in the acute stage just after the occurrence of the accident, the prognosis is immediately good. If replacement be delayed until rigid contraction renders it more difficult, the prognosis will be correspondingly more serious. The possible dangers in acute inversion are from hemorrhage, shock, collapse, and acute infection.

*Chronic inversion*, unless relieved by replacement, is apt to destroy health—if not, indeed, life—by slow, exhaustive hemorrhages, uterine discharges, and consequent anæmia; and nervous exhaustion by surgical efforts to replace the organ and the possibility of its removal by mistake for a myoma are positive sources of danger. Acute infection and peritonitis are among the always dreaded possibilities. Few authentic cases of spontaneous reposition have been recorded.

In rare instances the inverted uterus gives little or no trouble, even when associated with complete vaginal inversion; the uterine and vaginal mucosa may possibly undergo changes to make them resemble skin; the surfaces become hard, tough, parchment-like, and wrinkled. Hemorrhages cease, and the woman may live to old age in comparative comfort.

### Treatment of Acute Inversion of the Uterus.

Puerperal inversion usually takes place in the presence of the attendant between the birth of the child and the delivery of the placenta, and may, therefore, in the acute stage be recognized while the uterine walls are still sufficiently relaxed to permit immediate replacement.

If the placenta is still attached it should be rapidly removed. The hand is then introduced into the vagina and the fundus pushed up through the cervical canal into place. Strong contractions, with alternating relaxations, are usual in this stage. Reduction by taxis is almost impossible during the contractions. Instead, therefore, of handling or kneading the organ, to reduce its size by contraction, the attendant waits patiently for relaxation, and then makes a steady, firm, and prompt effort at replacement. The whole corpus may be at once carried up or it may be necessary with the finger-tips to indent the fundus at some point, preferably one of the cornua, and let this be the starting-point of the replacement.

A fountain or, better, a Davidson syringe of interrupted current and hot water, should be ready, in order that while the hand is still in the uterine cavity a hot douche may be thrown rapidly into the uterus. The hot water, by its stimulating effect, sets up strong uniform uterine contraction; this controls hemorrhage and prevents a recurrence of the inversion. The hot water uterine douche in the control of post-partum hemorrhage acts in the same way. Within a few hours after the accident firm uterine contraction or retraction takes place in the muscular walls of the inverted uterus. When such retraction is once established replacement will usually be quite as difficult as if the con-

dition had existed for months—that is, the change from acute inversion to chronic is very rapid.

#### Treatment of Chronic Inversion of the Uterus.

Until a comparatively recent time the inverted uterus, once contracted, was regarded as incurable except by hysterectomy. On the possibility of replacing an inverted uterus after the organ had contracted, the late Charles D. Meigs, of Philadelphia, in his letters to the students of his class, in 1846 wrote: “You might as well attempt to invert one of the non-gravid uteri on my lecture-table as to reposit this one. The time for replacement has gone by.”<sup>1</sup>

The Obstacles to Reposition are these:

1. Great rigidity in the contracted cervical ring.
2. Increase in the volume of the corpus uteri from congestion. This occurs soon after inversion.
3. Later increased firmness and hardness in the uterine structures from involution.
4. The mobility of the organ and the difficulty of opposing above sufficient counter-pressure to the force applied below in the effort to replace.
5. Adhesions between the sides of the peritoneal cup are rare, but if present might prevent reposition.

Methods of Reposition. The difficulty of overcoming the obstacles above outlined is apparent from the manifold methods which have been practised by different surgeons. The lesson to be learned from the combined experience of these methods is that success is best attained by firm, steady, continuous, elastic pressure, and that it may finally depend upon very prolonged and patient effort.

The object is to overcome the rigidity in the cervical ring. The pressure to accomplish this may be unyielding or elastic. The treatment includes the following possible procedures:

1. Replacement by the unaided hands.
2. Replacement by the hands aided by incisions or instruments.
3. Continued elastic pressure.
4. If reduction is impossible the final resort is hysterectomy.

If one method fails, a combination of two or more methods may succeed.

Preparatory Treatment. It is always possible in the course of an attempt at reposition that emergencies may arise which necessitate abdominal or vaginal section; hence, the necessity of making the preparations as for those operations. See Chapter II. In addition to the above, iron may be required for anæmia, and hemorrhage may be controlled by hot water or aseptic gauze tamponade in the vagina. In a very anæmic case several weeks or even months of recuperative treatment may be essential.

Reposition with the Hands, Emmet's Method.<sup>2</sup> The patient, anæsthetized, is in the lithotomy position. The left hand is passed into the vagina, the fingers and thumb are forced as far as possible into the

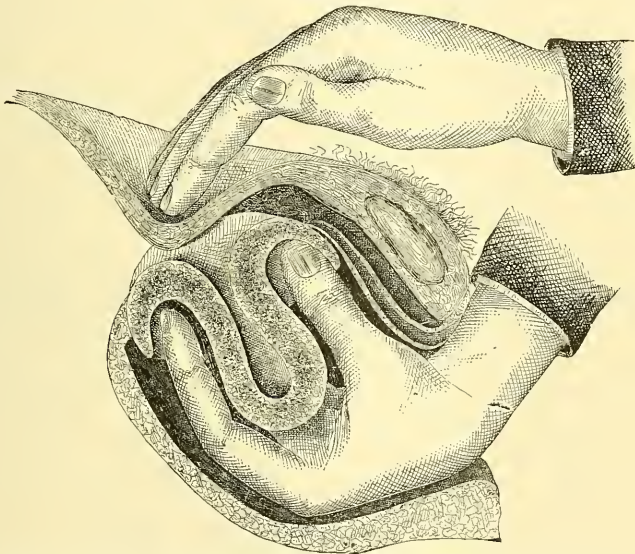
<sup>1</sup> Emmet. Principles and Practice of Gynecology.

<sup>2</sup> Loc. cit.



angle of reflexion, so as to encircle the part of the corpus uteri close to the constricted cervical ring. The fundus is in contact with the palm of the hand, and is firmly pressed upward by it, while the fingers are separated to their utmost to open the cervix. At the same time the right hand behind the pubes slides the abdominal wall back and forth over the peritoneal cup. The object of this is to open out the contracted ring; this effort is continuously repeated. Finally the rigid cervix uteri may begin to dilate, the corpus may grow shorter, and the extent of inversion may proportionately lessen. After the corpus has been partially forced within the cervix by steady upward pressure, the tips of the fingers are brought together as a wedge, passed through the os, and made to complete the reposition.

FIGURE 396.

Emmet's method of reducing an inverted uterus by means of the hands alone.<sup>1</sup>

Emmet's method is much facilitated by keeping, for a few days previous to replacement, a widely distended Barnes' elastic bag in the vagina. The bag is firmly secured by a T-bandage. This dilates the vagina, makes room for the hand, and, by the elastic upward pressure which it exerts, may dilate the constricted ring or even effect replacement. In one case complete reposition was made by Emmet's method in three hours and fifty-five minutes.

Emmet further suggests in case of partial reposition, when the corpus uteri has been passed inside the external os, that the work thus gained be secured by closing the external os with sutures. Figure 397.

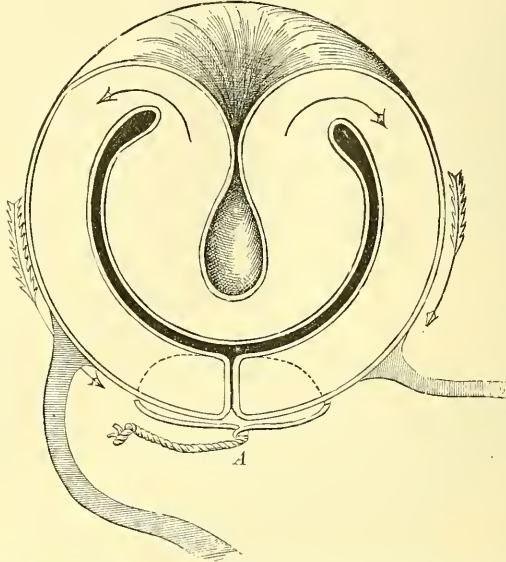
**Tate's Method of Taxis.**<sup>2</sup> The index- and middle-finger of the right hand are passed into the rectum, and the index-finger of the left

<sup>1</sup> Emmet. Principles and Practice of Gynecology.

<sup>2</sup> J. H. Tate. Cincinnati Lancet and Observer, March, 1878. Emmet.

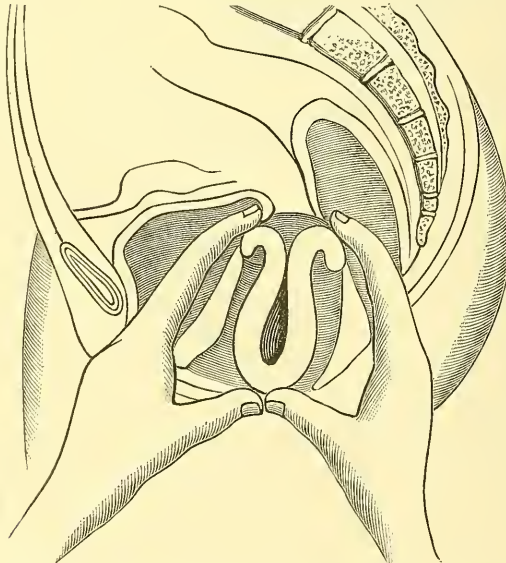
hand into the bladder through the dilated urethra. The balls of the thumbs make constant firm pressure over the fundus, while the fingers

FIGURE 397.



Emmet's method of retaining the partially repositd corpus uteri by closure of the external os with suture. The traction exerted in the direction of the arrows favors reposition.<sup>1</sup>

FIGURE 398.



J. H. Tate's method of making counter-pressure with the fingers in the rectum and bladder.

<sup>1</sup> Emmet. Principles and Practice of Gynecology.

in the rectum and bladder make counter-pressure against the cervix. In this way great force is applied more directly to the constricted ring than by any other method. In a case of forty years' standing, reported by Tate, the thumbs soon indented the fundus, the cervix began to dilate, the corpus was pushed through the cervix, and reduction was accomplished in a few minutes. Were it not for the danger of rupture of the urethra and consequent permanent incontinence of urine, this method would, perhaps, have the preference over all others. Every serious objection could, however, be overcome by opening the vesico-vaginal septum, as directed on page 281, and passing the finger through the artificial vesico-vaginal fistula thus made, instead of through the urethra. The fistula, after reposition, could be closed with little difficulty or loss of time and with practically no additional danger.<sup>1</sup>

There are numerous other methods of reduction by taxis, but they involve no valuable principle not included in those already mentioned.

**Elastic Pressure by the Water-bag or Colpeurynter.** This has already been mentioned in the preparation for Emmet's method. It is called colpeurynter. Reposition may be started by depressing with the fingers one horn of the uterus. The depressed portion, if forced onward, serves as a wedge to dilate the contracted cervix. The hand after a time becomes fatigued and useless. Long-sustained elastic pressure, interrupted occasionally by attempts at manual replacement, may then be effective. In many cases the elastic pressure alone will suffice. There is, however, no short limit to the time during which it may be necessary to continue it. In some cases reposition has been finally made only after two or three weeks of constant effort.

The best mode of using elastic pressure is that described by Thomas and Mundé.<sup>2</sup> Through a Sims' speculum tampon around the cervix firmly with aseptic gauze soaked in glycerin. This keeps the uterus from slipping out of the line of pressure. Shave the pubes. Then introduce a large rubber bag into the vagina and fill it with water; cut a strip of adhesive plaster two and a half inches wide, long enough to reach from the lumbar region, between the thighs, over the pubes up to the navel. There are two openings in the plaster, one for transmission of the tube of the rubber bag and one for the urethra. The plaster is cut in two just over the vulva, and that portion from the vulva to the anus lined with a layer of gauze. The two parts of the plaster are held together by three safety-pins, and may be opened during defecation or urination; the urine is drawn by a catheter. The pressure may be increased by tightening the plaster or pumping in more water; it may be decreased by loosening the plaster or drawing out water through the stop-cock on the tube. The patient is kept in bed; pain is controlled by opium or morphine.

Continued elastic pressure by colpeurynter is sometimes not tolerated, or it may be contraindicated by the presence of peritonitis. Then anæsthesia and sometimes more energetic measures are indicated.

**The Spiral Spring, White's Method.** A rapid and for many cases

<sup>1</sup> Suggested by Emmet. Principles and Practice of Gynecology.

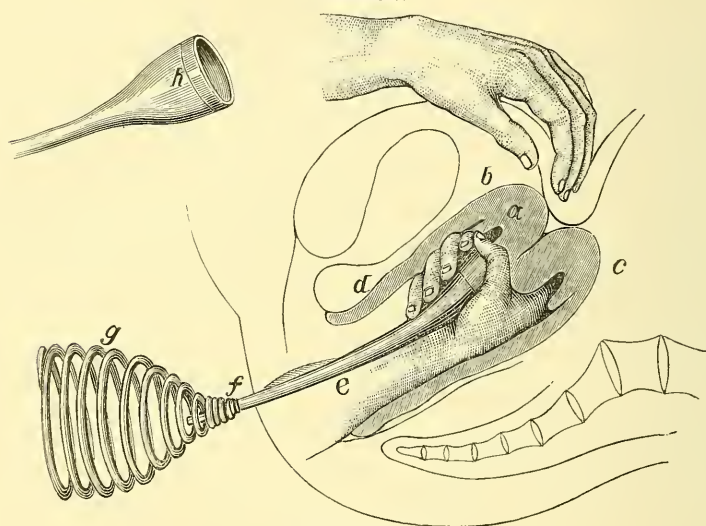
<sup>2</sup> Diseases of Women, p. 454.



effective method of elastic pressure is that of the spiral spring attached to a rubber cup.

Emmet's method may be effectively reinforced by the use of this instrument. The patient is anæsthetized. The left hand in the vagina grasps the inverted corpus uteri, and at the same time holds the fundus in the rubber cup. Projecting outward from this cup is a slightly curved rod, having a strong spiral spring attached to its end. The operator's body rests against the spiral, and through it exerts pressure upon the uterus. The disengaged hand is used for counter-pressure behind the pubes, as already described in Emmet's method. Figure 399 shows the instrument and its mode of use. Two or more hours of continuous effort may be required to reach the result. Numerous other similar instruments have been devised, but none more effective than this.

FIGURE 399.



White's repositor.

**Incision.** When the various forms of taxis, supplemented by gradual or rapid elastic pressure, fail, the rigidity of the cervix may be overcome by incision. This plan was suggested by the fact that, after forcible dilatation, the cervix was usually more or less torn, and that an incision would be preferable to a tear. Various forms of incision have been advocated or practised by James Y. Simpson, Marion Sims, Barnes, Matthews Duncan, and others. One method is to draw down the corpus and cut nearly or quite through the constricted cervical wall at one or more points, and then reduce the inversion by taxis or rapid elastic pressure. The favorite incisions are one in the anterior and one in the posterior wall of the cervix. Browne<sup>1</sup> makes an incision through the fundus. A strong dilator is then passed through the opening into the constricted ring and the cervix

<sup>1</sup> Playfair and Allbutt. System of Gynecology.

dilated until the corpus can be forced through into place. Just before reposition the wound in the corpus is closed with catgut sutures. If the asepsis be thorough, one might use intra-uterine gauze drainage in place of closing the opening.

These and similar methods of incision before the days of aseptic surgery were regarded as extra-hazardous, and were therefore generally disapproved. Under aseptic conditions, however, the danger would doubtless be less than was formerly supposed. With an aseptic field of operation and thorough gauze drainage in the uterus, the risk should not be greater than for other operations involving peritoneal incisions of equal extent.

The method of Thomas to open the abdomen, and especially that of Kuestner to open from the vagina into Douglas' pouch, in order to reach and directly dilate the cervix on the peritoneal side, have fallen into unmerited discredit.

Hysterectomy. If all efforts of taxis, elastic pressure, and incision have failed, the removal of the uterus may become a final resource. The operation would ordinarily be vaginal hysterectomy and would be performed substantially as described for cancer on page '338. The writer suggests that after the posterior and anterior incisions have been made from the vagina into the peritoneal cavity, another attempt at reposition be made. Through these openings great force could be applied by the mechanical principle employed in the method of Tate. The fingers should be introduced not into the rectum and vagina, but through the vaginal incisions. Counter-pressure could then be most powerfully made direct against the cervical ring.

In treating inversion of the uterus one should remember that sustained elastic pressure, if long continued, is usually effective and relatively safe, and that more rapid and radical surgical measures are dangerous and should be used only as a final resort.

## HERNIA OF THE UTERUS AND OVARY.

Hysterocele or hernia of the uterus is a rare and remarkable displacement. Cases have been reported by Olshausen, Leopold, Rectorzik, Winckel, and Scanzoni of displacement of the uterus into the sac of a crural or inguinal hernia.<sup>1</sup> In two cases the displacement was complicated by pregnancy which continued to the fourth month.

*The diagnosis* is based upon the absence of the uterus from its normal place and the presence of a body answering its description in the hernial sac. If pregnant, the uterus will progressively increase in size.

*The treatment* is the same as for any other form of hernia. If reduction by taxis is unsuccessful, herniotomy becomes necessary. This may involve removal of the uterus.

Hernia of the ovary may occur in the same way as hernia of the uterus, and is subject to the same principles of diagnosis and treatment. The author has personally seen but one case; that was successfully treated by herniotomy and removal of the ovary.

<sup>1</sup> Thomas and Mundé. Diseases of Women.

## CHAPTER L.

MASSAGE.<sup>1</sup>

## History.

MASSAGE, when applied directly by conjoined manipulation to the pelvic organs, is recognized as one of the most valuable of all gynecological resources. Its systematic employment is of comparatively recent date. The perfection of the method was the work of Thure Brandt, a Swedish teacher of gymnastics. In 1847 he began to utilize massage for rectal displacement, and in 1861 incidentally employed it with striking success for uterine prolapse. From this time on his services were in demand, and his methods gradually began to be adopted by a few physicians in his own country. Notwithstanding the fact that Brandt had familiarized himself with the physiological and anatomical data bearing upon the subject, had based his methods on correct scientific principles, and had made himself a master of the gynecological diagnosis so urgently necessary for the safe and efficient application of massage, his claims for a long time received but scant recognition.

Brandt's method in its entirety includes numerous gymnastic exercises, which, without the aid of trained assistants, cannot well be carried out. These exercises, though beneficial in most cases, are, by comparison with pelvic massage, of limited value.

## Indications.

Pelvic massage has a wide range of utility. Its principles, uses, and indications are in the following conditions :

1. Wide, loose adhesions or cicatricial cords binding down the uterus or its appendages in abnormal positions or locations.
2. Chronic residual exudates of inflammatory origin.
3. Cicatricial contractions.
4. Displacement of the uterus due to the above causes or to atony of the muscular and ligamentous supports.

Menorrhagia, metrorrhagia, amenorrhœa, and dysmenorrhœa are symptoms which may come from a wide variety of diseased conditions. Some of these conditions are and some are not indications for massage. It is useful for the relief of pain and for some pelvic neuroses, such as the pain which occurs in the cellulitis of Stapfer.

<sup>1</sup> In the description of pelvic massage the author has made free use of quotations and adaptations from the following sources :

Emil Kleen. Handbook of Massage, Hartwell's translation, 1892.

Ziegenspeck. Anleitung zur Massagebehandlung bei Frauenleiden.

Hiram Vineberg. Pelvic Massage in Gynecological Cases. American Journal of Obstetrics, 1893, pp. 161-392.

William H. Rumpf. Ibid., 1895, p. 37.

Jentzer. Gymnastique Gynécologique.

All the illustrations of this chapter are designed to explain the manipulations of Brandt, and have been redrawn with but slight modifications from the figures of Jentzer and Ziegenspeck.



Contraindications.

Numerous disappointing and disastrous results have followed the use of pelvic massage; they have all been consequent, however, upon faulty technique or failure to exclude the unsuitable cases. The contraindications are:

1. Acute inflammatory conditions of the uterus and its appendages, especially perimetritis and pyosalpinx.
2. Acute parametritis.
3. Malignant disease.
4. Tuberculosis, syphilis, gonorrhœa, and, as a general rule, pregnancy.

In cases of enlarged tubes it is well, unless an absolutely certain diagnosis has insured the absence of suppuration, to follow the rule of withholding the treatment. Brandt himself uses special caution during menstruation. He precedes and follows each séance with "decongestionizing" gymnastic movements, designed to reduce the afflux of blood to the pelvis. If one observes this precaution, with shorter and more gentle manipulations, the objections to the treatment during the menstrual period become mainly æsthetic, and do not therefore necessarily counterbalance the advantage to be derived by its continuance at this time. Brandt himself dispenses with massage during menstruation in cases of young menorrhagic women.

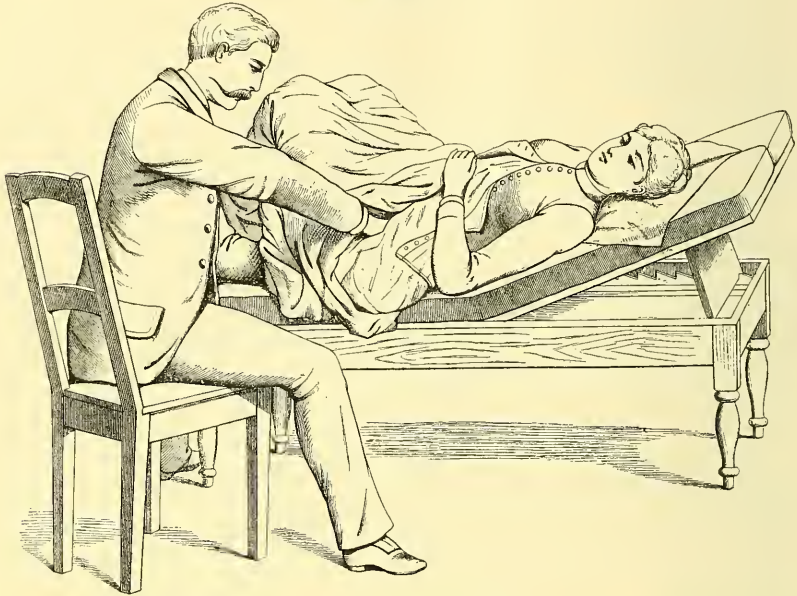
It is clear from what has been said that the first and most important point to be considered in pelvic massage is the diagnosis. Unless the conditions within the pelvis are accurately known, or, at least, unless we can exclude infection and suppuration of the tubes, it is best to prohibit the treatment. Actual acute inflammations are quite readily detected, but it is often difficult, in chronic enlargement of the Fallopian tube, to say whether there is suppuration or not. The practice recommended by Brandt and indorsed by Ziegenspeck, of massaging the tubes to force their contents downward toward the uterus, is dangerous and disapproved. Such contents are quite as likely to be forced into the peritonem, and, if infectious, may there give rise to infection. Even the most skilful diagnostician cannot always exclude this possibility.

An objection commonly urged against massage is the danger that it may excite the sexual reflexes and produce erotic feelings. Such excitations, however, will seldom occur if the hand and intravaginal finger are kept motionless against the posterior vaginal wall and well away from the clitoris. A subject of erotic tendencies would clearly be unfit for the treatment. Properly conducted massage, in a suitable case, with the discomfort which it necessarily entails, need not necessarily provoke erotic feelings. The same objection may be urged against an examination of the heart or against ordinary abdominal massage commonly given for constipation. Much depends upon the individuality of the operator. It is clearly desirable that the treatment, so far as practicable, be given by a woman.

## Action of Massage.

Massage in the pelvis, as in other regions, quickens the circulation, prevents stasis in the lymph channels, furthers resorption and retrogressive metamorphosis, gives tone to the muscles, excites muscular activity, and so improves the nutrition.

FIGURE 400.



Massage by Brandt's method. The operator is turned slightly away from the patient in order to show the position of his arms.<sup>1</sup>

## General Principles of Technique.

Pelvic massage is not so difficult or technical as to be beyond the ability of the majority of physicians. As already stated, the essential and difficult part is in the preliminary diagnosis. It requires an elastic touch, a long finger, patience, endurance of fatigue, and diagnostic acuteness and skill. With these, any one may learn to perform it efficiently and safely. It is tedious and fatiguing to the operator, but the séances are generally short, lasting, as a rule, less than fifteen minutes.

It may be assumed that the practitioner will have recognized the conditions for which he desires to employ massage. The description of the method of Brandt's preliminary examinations may therefore be omitted.

"<sup>2</sup>The patient lies with her hips resting on the end of a low couch, with the thighs and legs flexed and the feet resting on a chair placed about a foot from the end of the couch. The operator sits at the left

<sup>1</sup> Roberts. Ziegenspeck über Thure Brandt's Behandlung von Frauenleiden.

<sup>2</sup> Adapted, with minor changes, from Rumpf. American Journal of Obstetrics, 1895, vol. xxxi. p. 37. Adaptation extends to last paragraph on page 606.

of the patient, and introduces one, or, better, two fingers of the left hand into the vagina, passing his arm under the left knee of the patient. The sole purpose of the fingers in the vagina is to raise or fix the parts to be treated. The massage is done entirely with the right hand. See Figure 400.

“After having introduced the fingers of the left hand, the right hand is placed on the abdomen. It is passed from above under the skirts, which have previously been loosened at the waist. The patient is entirely covered; she is resting on an ordinary couch and not a fear-inspiring operating-table, and will give infinitely less trouble as regards contraction of the abdominal muscles than when in the usual position for examination. The massage may now be commenced. Great tenderness may make this difficult, but is not a necessary contraindication; indeed, tenderness alone is sometimes an indication for massage. It should consist of gentle circular motions in the direction of the venous circulation of the organ to be manipulated. Brandt himself gives the following rule: ‘Begin all massage gently, more in the surroundings of the diseased part, and when the first tenderness has disappeared bear on more heavily, with short intervals of rest. Stop the massage gently as you began, and finish by placing the hand flat on the abdomen and making a few short, vibrating motions.’

“This procedure should be repeated daily; the time of each treatment should be about ten minutes. Menstruation is not necessarily a contraindication; in fact, the treatment will often be found at that time most beneficial for the relief of dysmenorrhœa. It may be difficult at times to exclude the contraindications, especially pus and malignant growths. The massage itself aids materially in making an accurate diagnosis. The pain which makes it difficult accurately to outline the organs at the first examination may itself be an indication for massage. It is astonishing how much relaxation may be obtained by the use of gentle massage for a few minutes.

“An important factor in pelvic massage is the contractility of the uterus. Arendt<sup>1</sup> and other investigators have shown that any uterus, after being manipulated for some time, will contract. This is most strikingly illustrated in the puerperal uterus, but it is very frequently noticed during the massage of a non-puerperal uterus. It is easier to map out from its surroundings a uterus that is hard than one which is soft and flabby. Narcosis in the examination of patients to verify diagnosis may be dispensed with in many cases by the use of massage. The patient is really being examined during the whole time of the treatment; the rapid circular motion, by removing the congestion, helps to relieve the tenderness. By beginning the massage around the sensitive part the patient’s attention is diverted from the pain. The hand is gradually pressed more deeply into the pelvis, and at each treatment some thickening or adhesion may be discovered which was not so apparent at the previous examination.

“Another most valuable result which is obtained incidentally from massage treatment is the regulation of the bowels. In all cases

<sup>1</sup> Arendt: Contractility of the Uterus. Transactions Tenth International Medical Congress, Berlin, 1890.



in which there is chronic constipation—and the exceptions are few—the treatment should be concluded by making the circular movements for a few minutes along the ascending, transverse and descending colon. The results have been very gratifying. This mechanical mode of regulating the bowels has a good effect also on the other pelvic organs. It results in relieving the pressure of the distended intestines on the bloodvessels. The importance of regulation of the bowels is often overlooked. The tampon frequently gets the credit when the cathartic pill deserves it. Brandt has had better success than his disciples, because he has laid so much stress on general treatment, and especially on Swedish gymnastics, which, carried out properly and scientifically, will always be of material use. If the practitioner is not prepared to direct these exercises he should place them in the hands of a competent medical gymnast; they form a special branch of study and the acquirement of a proper knowledge of this gymnastic work would require many months of practical training.

“One of the most important pathological conditions in which massage has been found very useful is retro-deviation of the uterus. A typical, chronic, fixed retroflexion, with firm adhesions, thickening and infiltration of all the ligaments, and large congested uterus, has always been a gynecological bugbear. The forcible breaking of the adhesions is often very dangerous, and may cause fresh lesions which, healing by cicatricial contraction, will render artificial support impossible and make the patient's condition worse than before. In such cases the object of the massage is to relieve the pain and congestion, to raise the uterus gradually from its fixed surroundings, and, finally, to keep it in position. The first of these requirements is often fulfilled, the second is more difficult, and the third is the most difficult of accomplishment. By pulling at the adhesions every day, and by stimulating the circulation with massage, the fibrous tissue which has increased in consequence of inflammation disappears and the muscular and elastic tissues become regenerated. In other words, by mechanically removing the obstacles which impede circulation, massage helps nature to restore to the organs their normal tonicity. A procedure in the treatment which supplements the massage proper is the frequent lifting of the uterus and consequent stretching of the adhesions. Brandt has devised a very ingenious method of accomplishing this from the outside. See Figures 419, 420, 421, and the accompanying text.

“In chronic parametritis and perimetritis the ligaments are thickened by the products of inflammation; the thickened mass may compress vessels and nerves and causes a variety of distressing symptoms. In such cases massage should always be given at first gently and afterward more forcibly, so that even the whole right hand or fist may be used.”

The length of time that should elapse after an acute infection before massage may be safely undertaken varies with the conditions. Kleen places the limit at not less than two months in any case. The presence of pyosalpinx is always a contraindication. The nearer in time to an acute infection the more virulent the pus will be; on the contrary, the longer the time the more liable the pus is to be sterile. If, therefore, one should by error in diagnosis rupture or force the purulent contents

out of a tube into the abdomen, the danger of infection will decrease directly with the length of time that has passed since the acute attack.

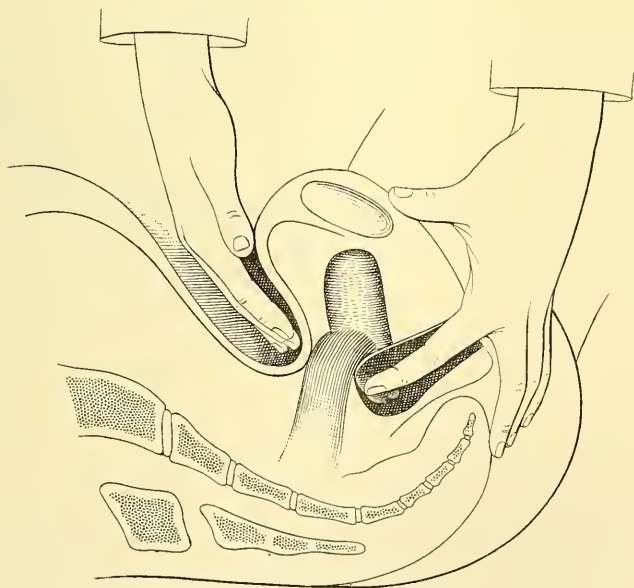
In chronic hydrosalpinx the fluid is usually sterile, and therefore not a serious contraindication to massage. The practical difficulty, however, is to differentiate it from pyosalpinx. One may carefully empty the tube by aspiration through the vagina, and if the fluid prove to be serum and sterile, the aspiration may be followed by massage with excellent prospect of cure and restoration of function. See Treatment of Salpingitis in Chapter XXIV.

In all cases great diagnostic skill is essential. The treatment must never be intrusted to the ordinary general lay operator. The specially trained lay masseur or masseuse may, however, under the immediate direction of the physician be entirely competent. The writer has for several years, with the most gratifying results, intrusted selected cases to a competent specially trained lay masseuse.

#### Treatment of Parametric Exudates and Adhesions.

Posterior and Lateral Adhesions. As in other pelvic massage and movements, the first one or two treatments will be tentative. When the sensitiveness decreases and the diagnosis is perfected, the

FIGURE 401.



Stretching or breaking posterior adhesions.

attempt is made gradually to stretch or break the adhesions and to stretch the contracted ligaments. Brandt preferred to execute the manipulations with the patient standing. Figure 401, taken from

Brandt's own work, however, shows the more usual bimanual method of stretching posterior adhesions with the patient on the back.

The uterus, it will be seen, is utilized as a handle by which the intra-vaginal finger and the externally applied hand exercise mild traction in the direction opposed to the fixation. If the uterus is drawn to the right by contraction of a broad ligament, the position of the hands in relation to it will be such as to make traction in the opposite direction. If posterior adhesions are associated with lateral displacement from adhesions or from contraction of a broad ligament, the uterus

FIGURE 402.



Stretching adhesions anterior to the uterus. Brandt's method.

may be pushed in the opposite oblique direction by recto-vaginal conjoined manipulation, that is, by means of the left index-finger in the rectum, the thumb in the vagina, and the right hand over the abdomen. Figure 415. These movements may be executed wholly with the left hand and with the patient standing. In that case they should be finished by conjoined manipulation on the couch, as above described. All must be done with the greatest care and with gentle firmness. Otherwise, capillaries may be ruptured and exudates may form.



Treatment of Anterior Adhesions and Contractions.

The beginning of this treatment is with the patient standing. See Figure 402. The thumb is introduced into the anterior cul-de-sac of the vagina, the elbow being supported by the knee of the operator, and gradual pressure is exerted upward by a gentle movement from the raising of the knee. As soon as there appears a limit to the ready extension of the tissues the pressure is stopped. This is repeated several times in front and on the sides of the cervix uteri until the

FIGURE 403.



Stretching adhesions anterior to the uterus. Brandt's method.

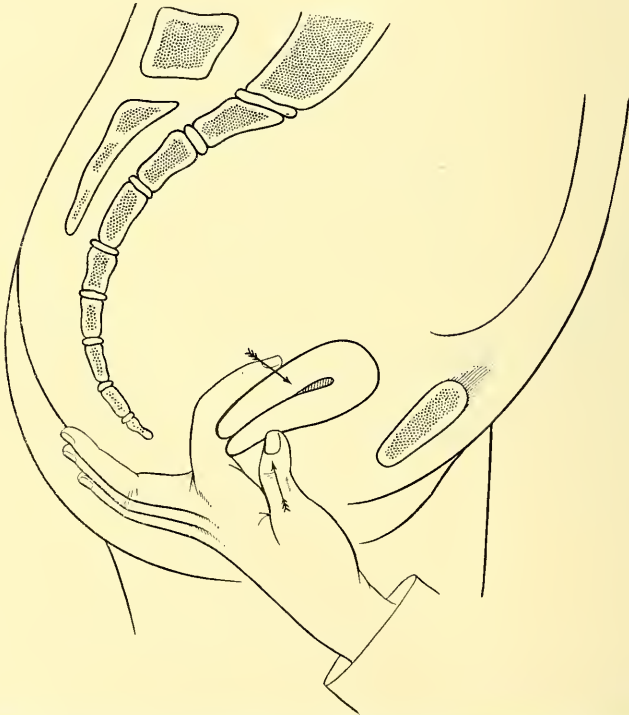
adhesions have attained a certain degree of elasticity. When, after two or more treatments, the parts have become sufficiently mobile, the patient is placed in the recumbent position and the treatment continued bimanually. With the left index-finger in the posterior cul-de-sac, the body of the uterus is now raised as far as practicable in the median line. The intravaginal finger is now transferred to the front of the cervix while the external hand readily pushes the uterus backward so as to move it away from the symphysis and still further stretch the adhesion bands. See Figure 403.

By pressing the fingers of the external hand down behind the symphysis they are made to meet the intravaginal fingers in front of the uterus. The two hands thus brought together now push the uterus in the following directions: the internal fingers backward and upward, the external hand backward and downward. See Figure 403. At the close of the treatment the massage is applied to the broad ligaments and folds of Douglas.

### Replacement and Retention.

When the mobility of the displaced uterus has been secured its replacement and retention in its normal position is the next indication. Brandt's method includes numerous manipulations which, from experience, he has found suited to the replacement of the uterus and to give it stable equilibrium. The leading features of his methods are given in the following paragraphs and illustrations, taken mainly from Jentzer.

FIGURE 404.

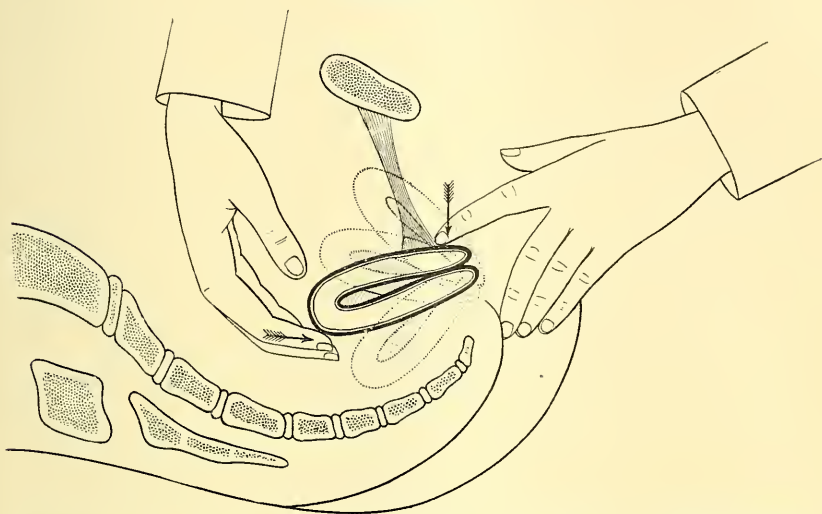


Large uterus. Patient erect or recumbent; index-finger in rectum as high as possible, pushing corpus uteri downward and forward, while thumb in vagina presses cervix upward and backward.

The degree to which the manipulations are necessary will depend upon the breadth and strength of the adhesions and bands and the amount of contraction in the ligaments. Even at the risk of prolixity it is well, however, to repeat. *All manipulations must be only on cases carefully*

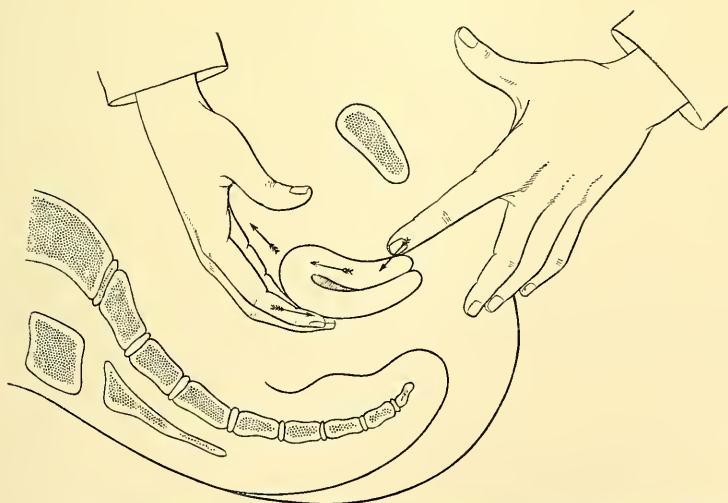
*selected according to the indications and contraindications already given, and must be as gradual and free from pain as practicable.*

FIGURE 405.



Uterus small and hard, with resisting anterior attachments. Dorsal position; intravaginal finger pushes cervix downward and backward; corpus thrown forward on its transverse axis; right hand draws corpus upward and forward by exerting force through abdominal wall.

FIGURE 406.



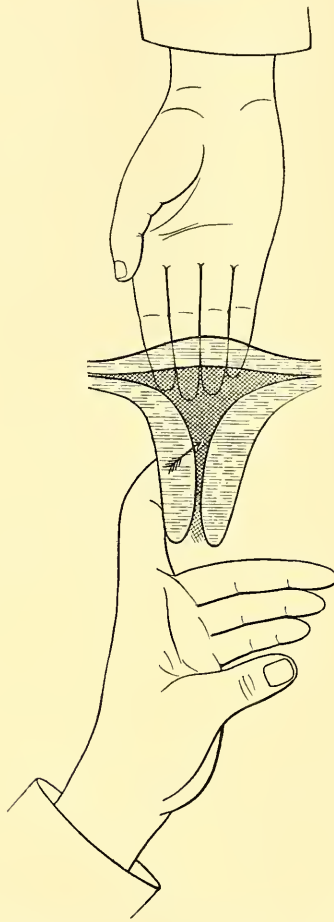
Uterus small and hard, with anterior attachment but not very resistant. Dorsal position; fundus surrounded and pressed forward with fingers of right hand; left index-finger pushes cervix upward and backward.

Figures 401 to 407, with their accompanying explanations, will, though meagre, serve to guide the operator in the right direction. All



these manipulations are supplemented by stroking, vibratory, or circular frictionary movements with the external hand.

FIGURE 407.



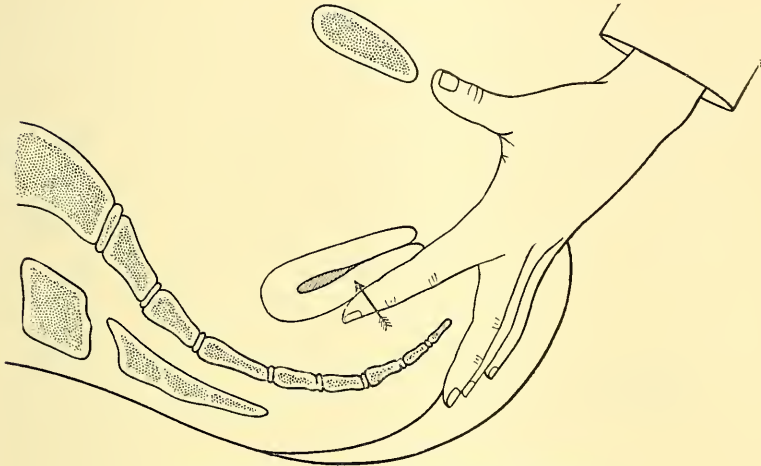
Indicated when uterus is soft, retroflexed, and mobile, and the angle of flexure is increased by pressure on the cervix. Dorsal position; left index-finger pushed into right vaginal cul-de-sac toward the fundus and flexed. This makes pressure on the posterior uterine wall. At same time external hand presses the fundus forward by exerting force through the abdominal wall.

### Ventro-vaginal Reposition.

The five figures which follow are to be taken together, and will serve to explain one of Brandt's methods of replacing a retroposed uterus. The patient is in Brandt's position, Figure 400. The uterus is long and flexible and somewhat fixed. The left index-finger in the posterior vaginal fornix as high as possible raises the uterus toward the abdominal wall—Figures 408 and 409—while the fingers of the right hand above the symphysis press down on the cervix, the point of

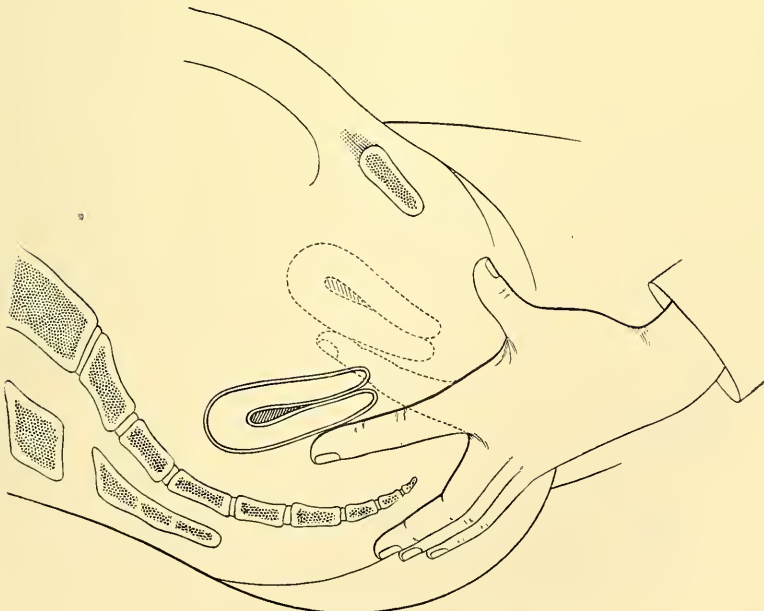
pressure being as nearly as possible the plane of the internal os, Figure 410. The left index-finger then leaving the posterior passes to the anterior fornix and approaches the fingers of the right hand, Figure 411. Both hands, acting together, push the cervix upward and backward, and the uterus tends to slightly fall over forward.

FIGURE 408.



Ventro-vaginal reposition ; beginning of first step.

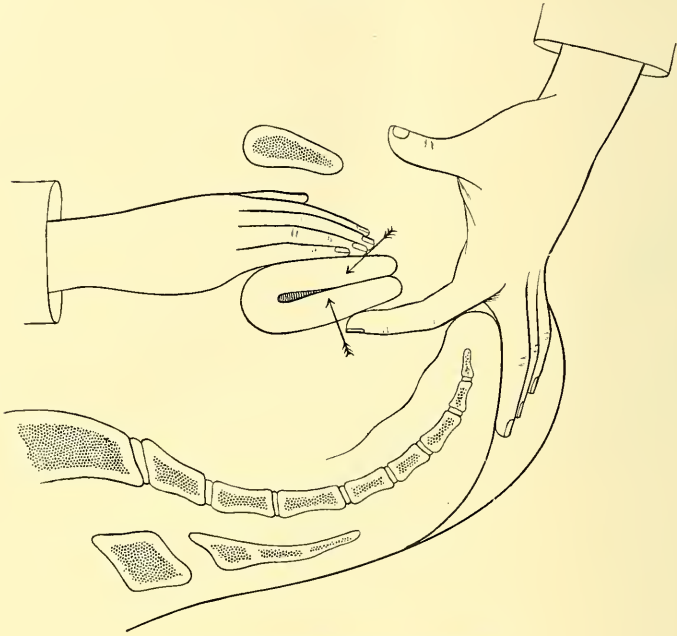
FIGURE 409.



Ventro-vaginal replacement ; end of first step.

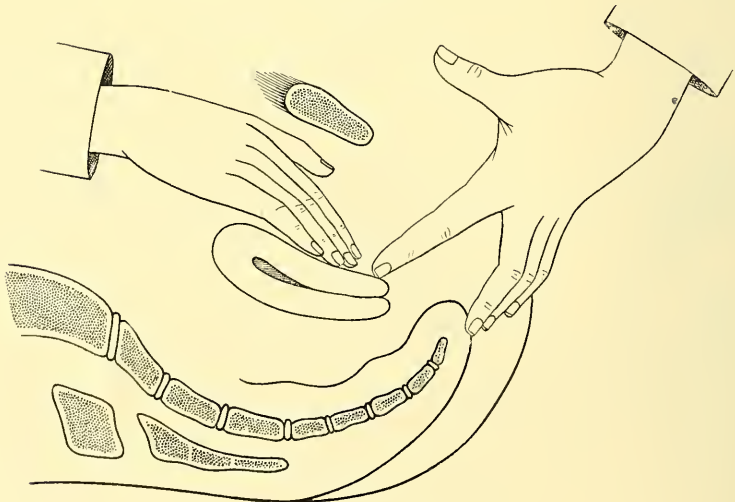
Then, keeping the left index-finger fixed, the fingers of the right are passed lightly along the right border of the uterus until they pass the fundus, which they then press forward, Figure 412. The

FIGURE 410.



Ventro-vaginal reposition ; second step.

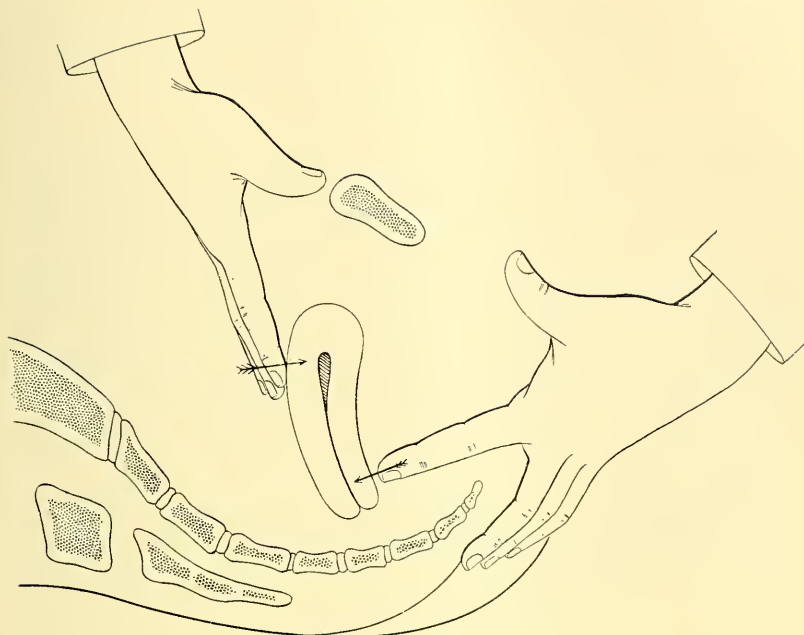
FIGURE 411.



Ventro-vaginal reposition ; third step.

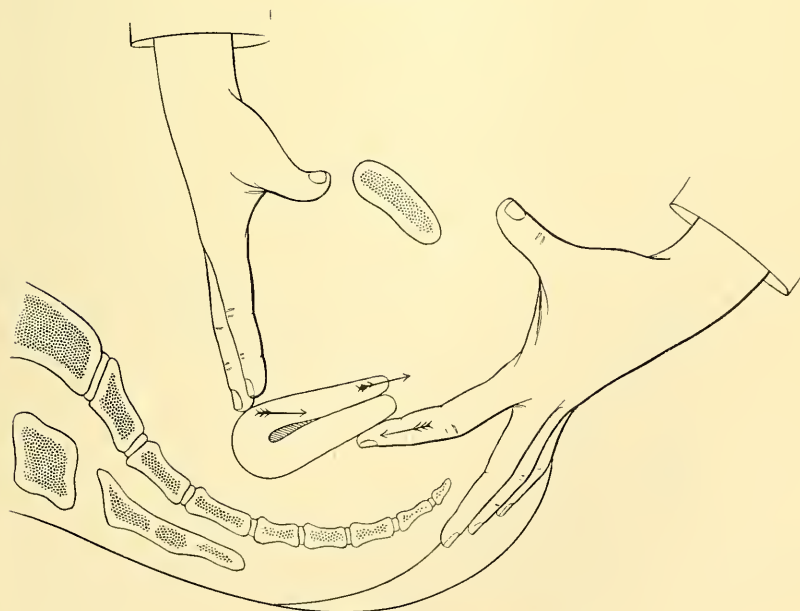


FIGURE 412.



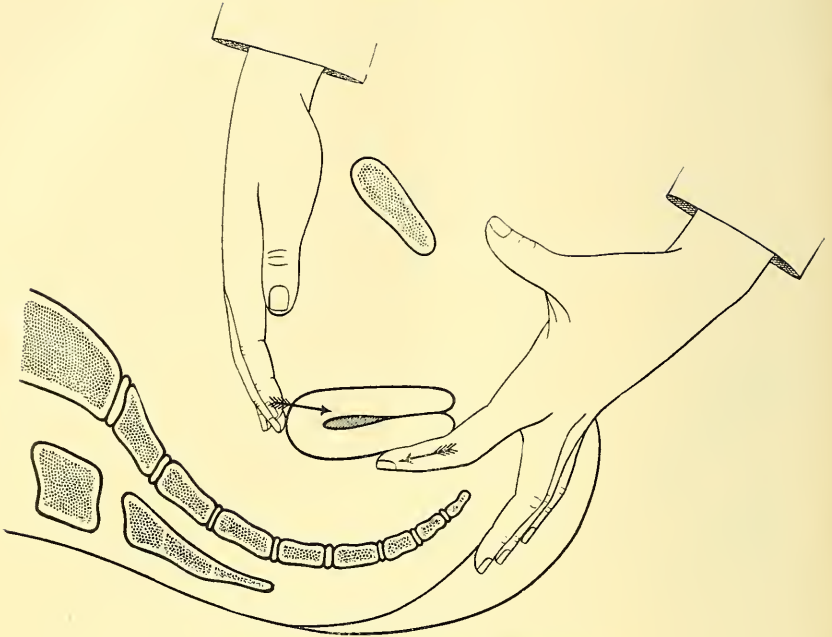
Ventro-vaginal reposition ; final step.

FIGURE 413.



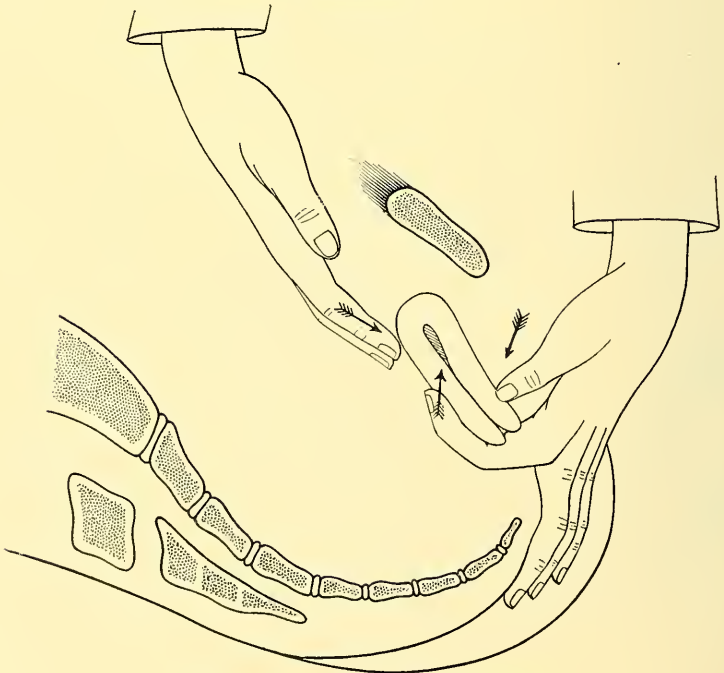
Ventro-recto-vaginal reposition ; first step.

FIGURE 414.



Ventro-recto-vaginal reposition ; second step.

FIGURE 415.



Ventro-recto-vaginal reposition ; final step.

organ then lies extended along the left index finger. It is essential for the success of this manœuvre that the uterus should be kept always in the median line or in the replacement swung around slightly to the left.

**Ventro-recto-vaginal Reposition.**

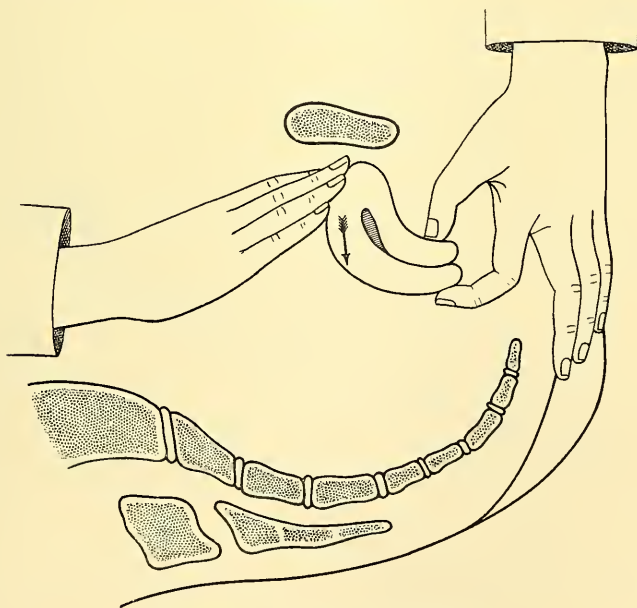
This method of replacement is illustrated by the three preceding figures. It is indicated when the retroposed uterus is long and soft. The left index-finger, high up in the rectum, pushes the fundus forward, while the right hand on the abdomen executes some circular and vibratory movements. As the muscles relax the external fingers approach the fundus and push it downward so that it can be readily reached by the finger in the rectum; this finger is then aided by the thumb in the vagina pressing the cervix backward. The fingers of the right hand, continuing the circular movements, then insinuate themselves behind and under the fundus and complete the replacement. Figure 415.

**Treatment of Antelexion.**

Two methods are recommended :

**First Method.** The antelexion is reduced to a temporary retroversion. This is accomplished by fixing the cervix between his left thumb

FIGURE 416.



Treatment of antelexion ; first method.

and index-finger in the vagina and rectum respectively, and pushing back the fundus, and then straightening the organ with the index- and ring-fingers of the right hand, as shown in Figures 416 and 417.

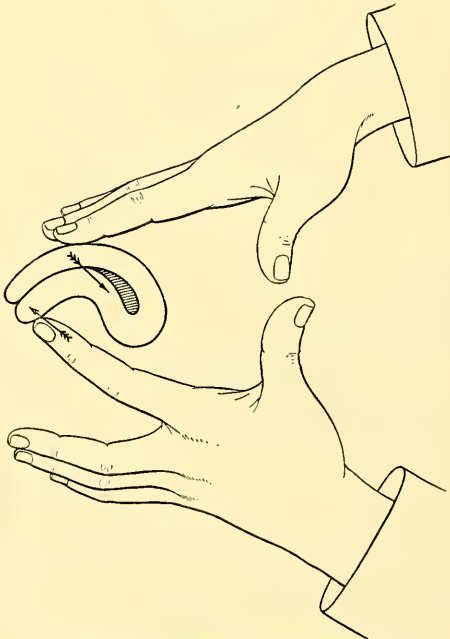


FIGURE 417.



Treatment of anteflexion ; first method.

FIGURE 418.



Treatment of anteflexion ; second method.

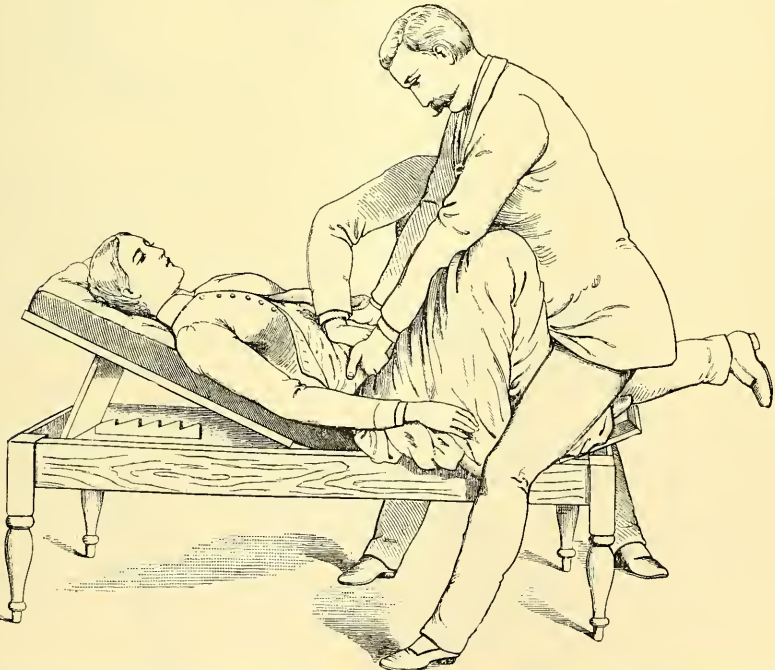
**Second Method.** The treatment consists of pushing the cervix upward and backward with the left index-finger, while with the right hand the operator exerts a forward and downward pressure on the organ; this converts for the time the anteflexion into an extreme anteversion. This method is illustrated by Figure 418.

The two methods may be advantageously combined in one case. By the first, massage is applied to the anterior uterine wall; by the second, it is applied more especially to the posterior. When the displacement is associated with dysmenorrhœa the massage may be given during menstruation, with sometimes great and immediate relief. It should also be continued during the intermenstrual period as well, and for at least a number of weeks.

**Treatment of Prolapse.**

Massage has not, except in the hands of Brandt and a few others, yielded good results in prolapse. In many cases of extreme prolapse, especially after senile atrophy of the uterus, the uterine supports have

FIGURE 419.

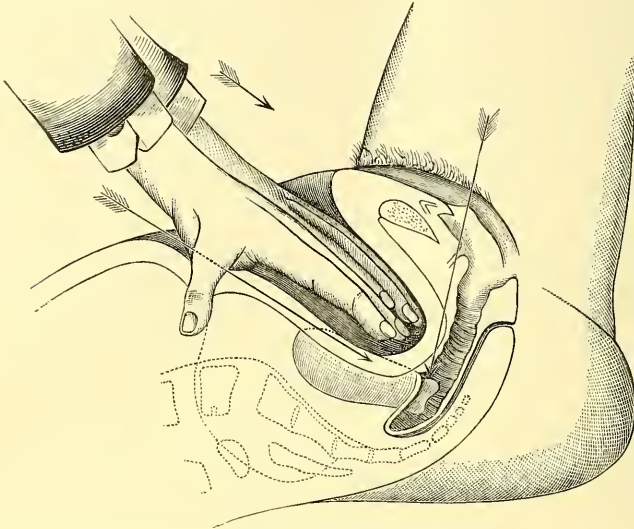


Position of the operator and assistant in the first step of lifting the uterus. The assistant's left index-finger in the vagina and right hand over the abdomen forces the uterus into the grasp of the operator.

permanently lost their tone and are beyond recovery. Simple elevation of the uterus by the fingers in the vagina and ordinary circular massage of the organ by the external hand, according to Vineberg, give

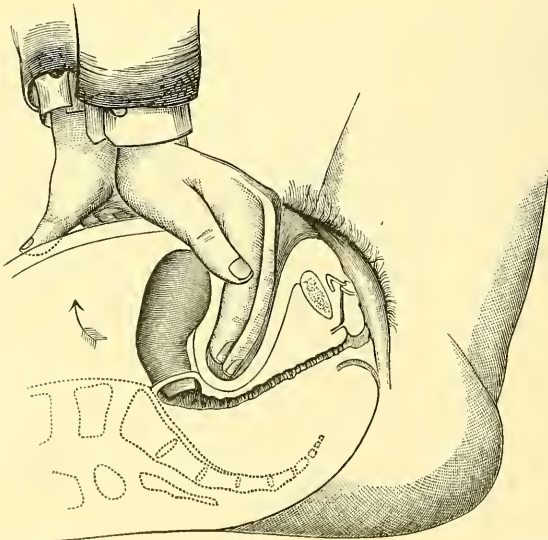
in many cases excellent results. The method of "lifting" the uterus has been practised and warmly indorsed by Brandt and some of his followers, and has in properly selected cases been most effective. This manipulation requires an assistant, who fixes the uterus parallel

FIGURE 420.



Lifting of the uterus. The long arrows indicate the positions of the assistant's hands. The operator bends forward, and his hands take the position shown in the figure.

FIGURE 421.



As the operator's hands take this position he straightens up, flexes his elbow, and strongly lifts the uterus.



with the os sacrum, between his two fingers in the vagina and his outer right hand. The operator now places his hands under the right hand of the assistant; the ulnar sides of his hands close around the uterus, grasp it and pull it upward toward the navel. After a little practice this is sometimes easily accomplished. Traction will be exerted not only on the posterior, but also on the anterior or vesico-uterine adhesions, which frequently, by shortening the anterior vaginal wall, prevent perfect reposition of the uterus. Figures 419, 420, and 421.

The original literature on the subject, to which the student is referred, contains full and elaborate descriptions of the "lifting" massage for prolapse. Its execution is difficult, time consuming, technical, requires a skilled assistant, and for the inexpert operator is unsatisfactory. The preceding cuts on lifting the uterus in the treatment of prolapse are from Jentzer.

Success in the treatment of prolapse has apparently been obtained only by great technical skill. It is evident that in this pathological condition we must frequently resort to surgical methods of treatment. In the forms of prolapse in which the pelvic floor is comparatively solid and not weakened by perineal lacerations—in which, in other words, the prolapse is due simply to a relaxation of the supporting ligaments of the uterus from subinvolution—Brandt's treatment may produce good results. In other forms perineorrhaphy, elytrorrhaphy, hysterorrhaphy, and shortening the ligaments may be indicated.

#### Treatment of Chronic Metritis.

Massage in chronic metritis follows the general rules laid down in the beginning of the chapter. When the changes are of a hypertrophic nature, of which subinvolution is an example, the Brandt method often gives prompt and excellent results. In those forms of metritis in which there are extensive sclerotic changes the treatment may give rise to symptomatic relief, but it cannot effect an anatomical cure.

#### Massage for the Fallopian Tubes and Ovaries.

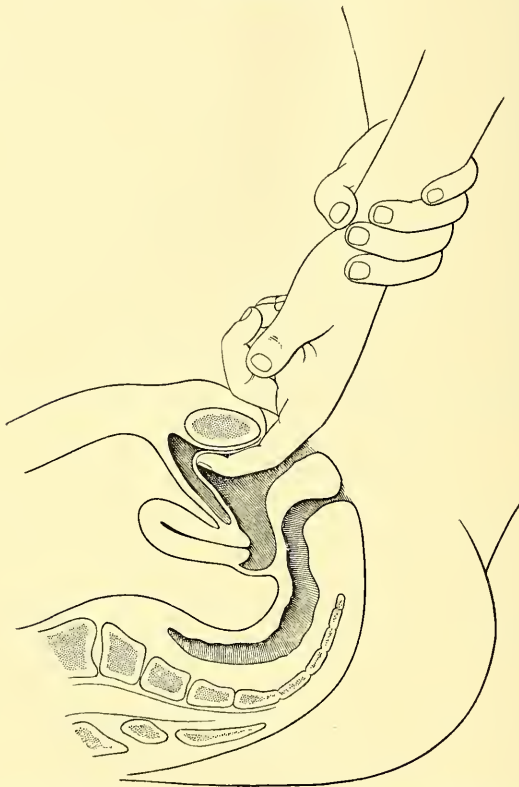
The propriety of massage of the tubes and ovaries has already been questioned on account of the possible contraindication of suppurative inflammation. In simply enlarged and indurated ovaries and tubes enveloped in parametric adhesions, massage would be a rational procedure, but for this objection: it is a treacherous peculiarity of tubal pus that its virulent germs are very often aroused by altogether imperceptible irritations to renewed and malignant activity.

#### Massage for Incontinence of Urine.

Incontinence of urine, especially that caused by long-continued pressure on the urethra during parturition, may sometimes be cured by a very few applications of a special form of massage devised by Brandt. The treatment may be promptly effective even in cases of very long duration.

**Procedure.** The operator faces the patient, who is in the ordinary dorsal position. He introduces the index-finger of the left hand so that it presses on the urethra throughout its entire length. He then grasps the left wrist with the right hand and, by making a vibratory motion with the latter, he transmits the vibrations to the finger pressing on the urethra. This procedure is repeated at each treatment four or five times.

FIGURE 422.



Urethral massage for incontinence of urine, patient in dorsal position.

### Summary.

In conclusion, pelvic massage, though not a panacea, is a rational therapeutic agent, and is applicable for the relief of many conditions which have been a reproach to gynecology, conditions for which there is no other equally good remedy. Its use in many instances will take the place of unnecessary formidable surgical operations that without it might be the only and the rather dubious alternatives to unrelieved suffering.

With the following general precautions, massage is a relatively safe remedy. In brief—

1. Be certain of the diagnosis, at least so far as to exclude the contra-indications of acute inflammation, suppuration, and malignant disease.

2. Insist that a sufficient time shall have passed between the last active inflammatory process and the beginning of the treatment.

3. Begin all massage gently and over a wider space, and as the sensitiveness decreases gradually concentrate on the parts to be especially treated.

4. Do not attempt actual tension or stretching of adhesions until the tissues are prepared by previous massage to endure it.

5. Reposition of organs is not to be attempted until relaxation and toleration are sufficiently secured.

6. Avoid at any time the causation of severe pain; discontinue the treatment if it appears. Be watchful for complications and accidents, and especially cautious in case of extensive perimetritic lesions.

7. Keep the control of treatment at least under the direction of a competent physician. It is essential that one specially skilled in the diagnosis of possible morbid conditions and complications be alone intrusted with the manipulations.





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
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